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See Page 518

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Vol. 30 OCTOBER, 1918 No. 4

Great Cross in Honor of War's Heroes

ONE of the most impressive monuments erected in this country in honor of the men who are giving up their lives in the great war is an immense Celtic cross, recently completed in a cemetery near Poughkeepsie, N. Y. It stands 34 ft. high and is 6½ ft. square at the base; while the top and the ends of the cross arm are 5 ft. square. The only ornamentation on the monument is a series of sunken panels on its four faces, each marked with small circular depressions, which produce effective contrasting shadows on an otherwise smooth exterior.

In erecting the cross, a steel frame was built, its base imbedded in a concrete foundation 10 ft. square and 10 ft. deep, and within the frame a brick flue was constructed, connecting with weep holes at the ground level, thereby providing for the drainage of any moisture that might accumulate in the interior. The surface is composed of concrete blocks with a cement and ground-granite facing which gives it the appearance of granite. An idea of the weight of the structure is gained from the fact that the four blocks forming the halo weigh over one ton each. At the base of the cross are four marble tablets bearing the names of the donors, with space reserved for those of 100 soldiers and sailors now in the war. Granite blocks were considered as building material for the cross, but were found too expensive, while by employing concrete as indicated the cost was reduced to four thousand dollars.

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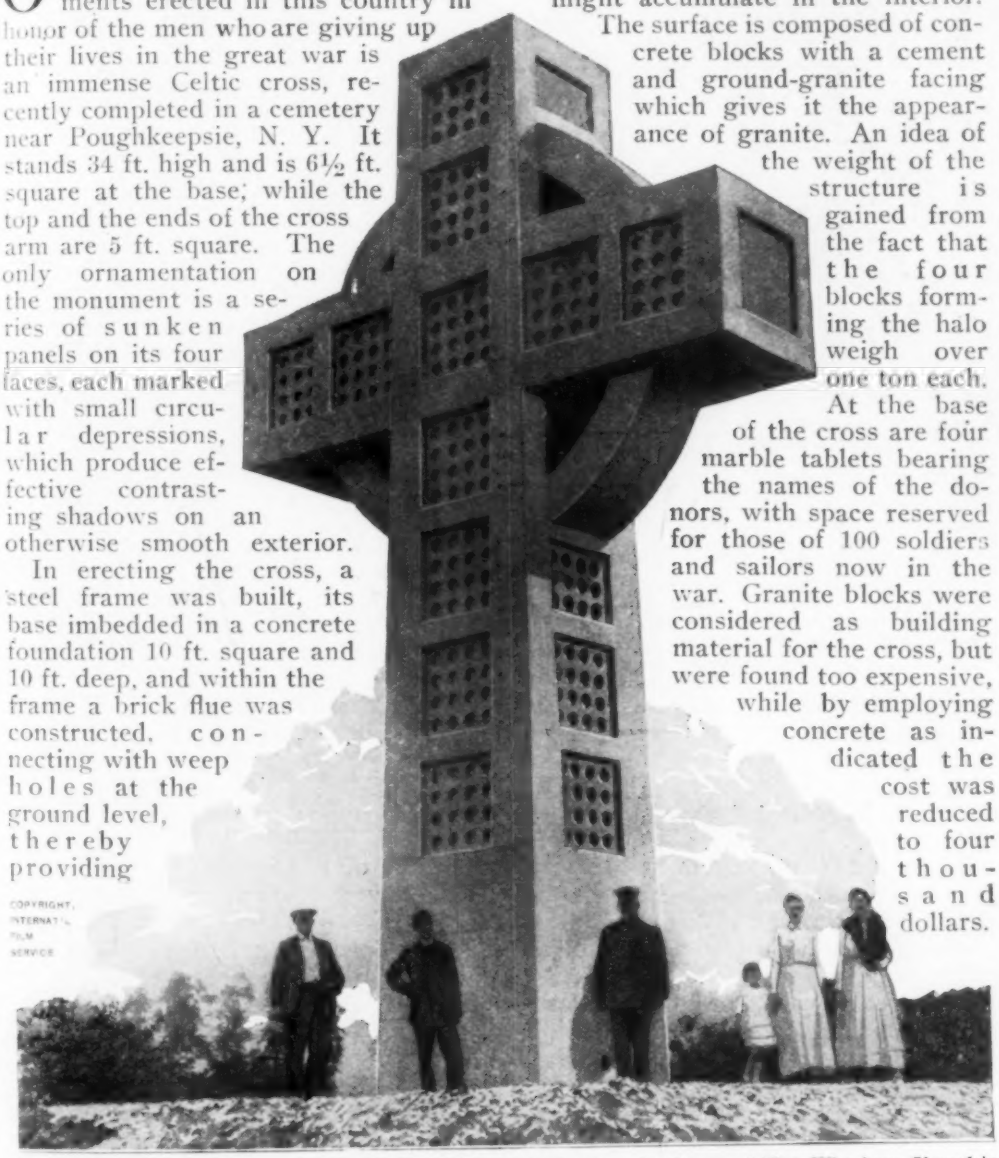
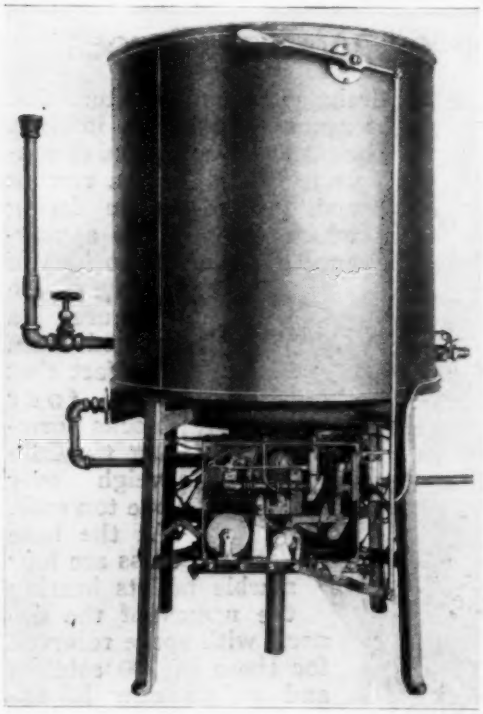


A Great Monument, and One of the First Erected in This Country, in Honor of Men Who have Shared in the Present War: It Stands 34 Feet High and is Made of Concrete Blocks, with Ground-Granite Facing, Built about a Steel Frame

AUTOMATIC HOUSEHOLD DISH-WASHING MACHINE

For household use an entirely automatic dishwashing and drying machine



This Automatic Machine Washes and Dries Dishes without Requiring Any Attention After Operation is Started

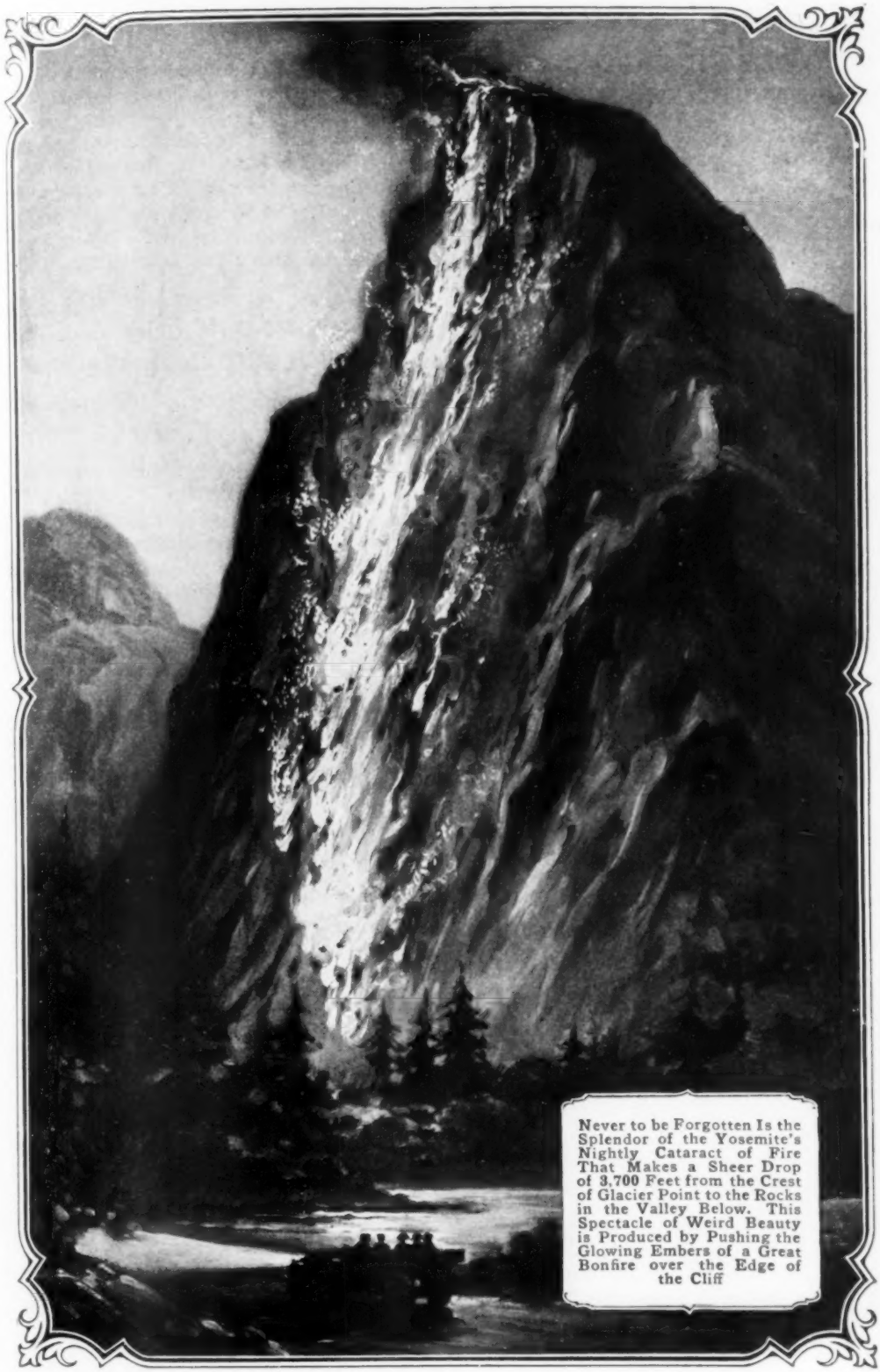
of apparently meritorious principle has been developed. It is quite unusual in that it performs its complete operation without requiring any supervision. Inside of a cylindrical tank racks are provided, which enable dishes to be stacked radially from the center. After this is done a gas burner beneath the machine is ignited, and the top of the tank closed. As soon as sufficient heat has been generated to insure a continuous stream of water, a thermostat opens a tap and starts an electric motor. The hot water is then forced under pressure through a whirling head and sprayed on the dishes. At the expiration of a definite interval, the water is automatically shut off and a blower started. Air, heated by the gas flame, is forced over the dishes, quickly drying them. Simultaneously a drain in the bottom of the tank is opened and the used water discharged. Thus, after the dishes have once been stacked in the machine and the gas lighted, the housewife's attention is not required until it is time to remove the cleaned and dried dishes and put them away.

WAR MACHINE SALVAGES TANGLED BARBED WIRE

A machine constructed somewhat after the order of a hay loader has been devised by an Englishman for recovering barbed-wire scrap in war-devastated areas. As it moves along, the tangled wire is picked up and cut into lengths, after which it is dumped into cars or pressed into bales.

CATARACT OF FIRE NIGHTLY SPECTACLE IN YOSEMITE

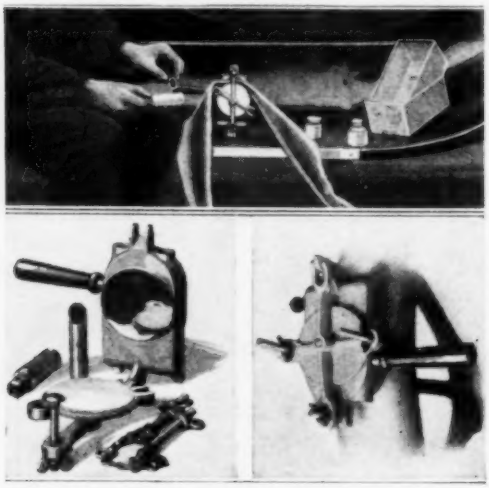
Nightly, in the Yosemite National Park, a remarkable spectacle enthralls tourists. A cataract of fire falls like a meteor from the crest of Glacier Point to the rocks in the valley 3,700 feet below. For a quarter of an hour thereafter, a shower of sparks fills the air like a swarm of millions of fireflies. Few pyrotechnical displays can approach this one in magnificence. Under the direction of the Department of the Interior, the park management causes a giant bonfire to be kindled at the edge of Glacier Point each night. It is allowed to burn until a great mass of glowing embers has accumulated. Then a dozen men with long-handled scrapers push the fire over the cliff, which may be seen from miles around. The first bolt of flame seems to spend several minutes in making the sheer descent of seven-tenths of a mile. It is followed by a burning tail that lingers in the air for many minutes before finally being swallowed up in the inky blackness of the night.



Never to be Forgotten Is the Splendor of the Yosemite's Nightly Cataract of Fire That Makes a Sheer Drop of 3,700 Feet from the Crest of Glacier Point to the Rocks in the Valley Below. This Spectacle of Weird Beauty is Produced by Pushing the Glowing Embers of a Great Bonfire over the Edge of the Cliff

DEVICE VULCANIZES TIRES MOUNTED AND INFLATED

A vulcanizer with which it is possible to repair a cut casing without removing it from the wheel or deflating



A Vulcanizer Which can be Clamped to an Inflated Tire on a Wheel, Making It Possible to Mend a Tire or Inner Tube with Very Little Delay

the tire, is an automobile accessory that not only saves time but makes it easy to do repair work soon after an injury is discovered. In this way a break is remedied before it is enlarged through much wear. The device operates on the same principle as other vulcanizers, but is so designed that it can be clamped to an inflated casing on a wheel, and it holds just enough gasoline, or alcohol, to fuse the tire and the crude rubber placed in the cut without injuring the former. The same device can be used in vulcanizing inner tubes. Each outfit comes neatly packed with all the necessary accessories.

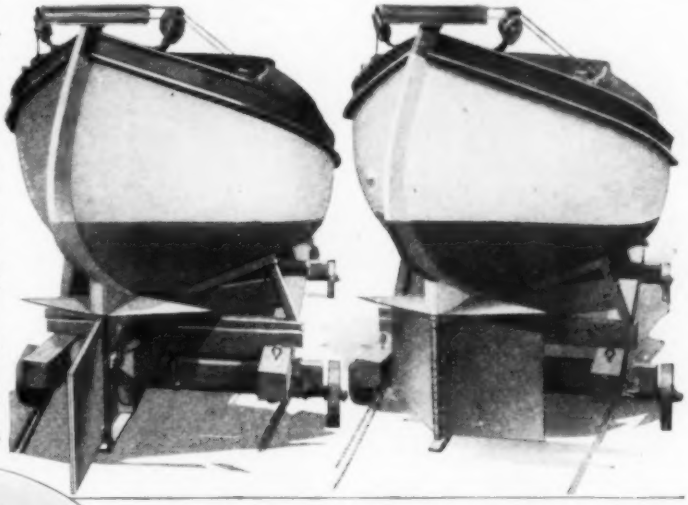
ROAD BUILDER AND GRADER WITH ENDLESS DRAGS

Moderate initial and operating expense as well as rapid work are features of a motor-driven, one-man road builder and grader of somewhat novel design that has appeared in the Midwest. The machine carries at opposite sides endless conveyor drags that are supported at right angles to it by adjustable booms. These members are inclined downward, so that as they operate at a speed of 200 ft. a minute they carry dirt from the sides of a 30-ft. roadway to the middle, filling depressions and building up the crown. Under ordinary conditions, it is said, the machine is capable of building a new road at a rate of one or two miles an hour. Road surfacing and dragging is accomplished at a speed of from two to three miles an hour.

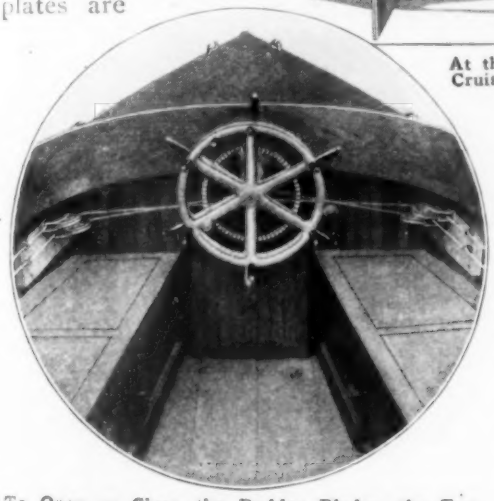
As the Machine Moves Slowly Forward, the Endless Drags at Either Side Convey Dirt from the Outer Sides to the Crown of the Road

CRAFT RESPONDS INSTANTLY TO TWO-BLADE RUDDER

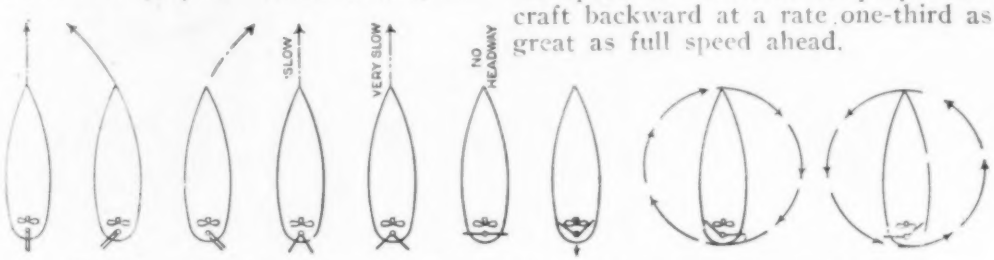
Power-boat devotees will be interested in the performance of an original reversing and controlling rudder that has been applied to a 25-ft. launch in an attempt to demonstrate the possibility of eliminating the reversing turbines of ships. Whether or not the object in view is feasible, the experimental equipment is interesting. It consists of two plates of ordinary rudder size, hinged to a dual rudder post composed of a steel rod within a tube. For normal cruising the plates are folded together. A double steering wheel is employed. When locked, the two members turn as one. At other times, when the two wheels are thrown in opposite directions, the leaves of the rudder are adjusted to desired angles. The equipment gives a boat a brake that is quick-acting; it enables reversement of direction with the engine running full speed ahead, and permits a craft to be turned in its own length. The demonstration boat is able to reverse direction from full speed ahead in nine seconds. It turns completely around in 20 seconds. Stopping and reversing are accomplished by setting the rudder blades in a V-shape, open part forward. The stream of water sent rearward against the plates by the propeller is projected forward by them along the sides of the boat. Its speed is sufficient to propel the craft backward at a rate one-third as great as full speed ahead.



At the Left, the Rudder is Shown as Used in Normal Cruising. At the Right, Its Blades Form an Obtuse Angle as When Set for Quick Turning



To Open or Close the Rudder Blades, the Two Steering Wheels are Turned in Opposite Directions. When They are Locked, They Act as One Wheel



The Diagrams Explain the Use of the Dual Rudder, Which in Recent Tests has Performed Most Interestingly

The "Quistconck," the First Ship Launched at Hog Island, Gliding from Its Ways to the Water: The Vessel was Sponsored by Mrs. Woodrow Wilson, Who Stands at the Left of the President on the Platform near the Middle of the Picture

THE ROMANCE OF HOG ISLAND

How, in the Span of a Few Months, an Army of Industrial Warriors has Built and Begun the Operation of the Most Marvelous Shipyard in Existence

By SEARLE HENDEE

This article has been passed by the Chief Military Censor.

LESS than a year ago Hog Island was a dismal morass of mud, stagnant water, and tangled weeds. A few months ago it was a national scandal. Today it is the world's greatest shipyard.

Hog Island has a name that lends itself to ignorant faultfinders and professional satirists. It has been viciously maligned and ridiculed. Labeled a "phantasmagoria of patriotic pretense" in the halls of Congress, it became, in the poisoned public mind, a national cancer fed by greed and corruption. Thus did German propagandists, their tools and puppets, for a time hinder the growth of one of the most powerful enemies of the Hun's U-boats.

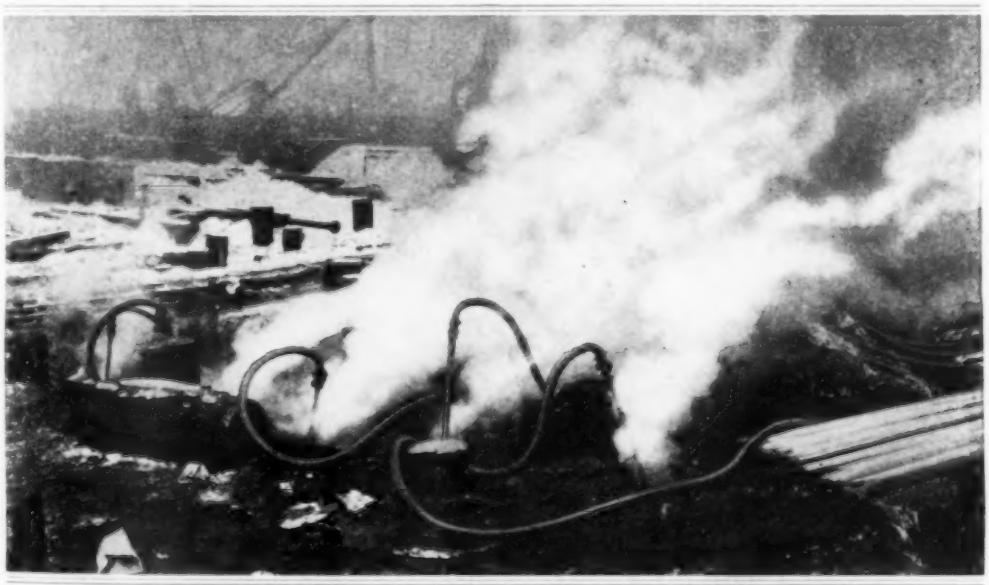
Hog Island needs no champion. Like the Statue of Liberty, it is a monument of American victory.

Without eulogy or comment, let the virile facts of this modern miracle of engineering skill tell their own story.

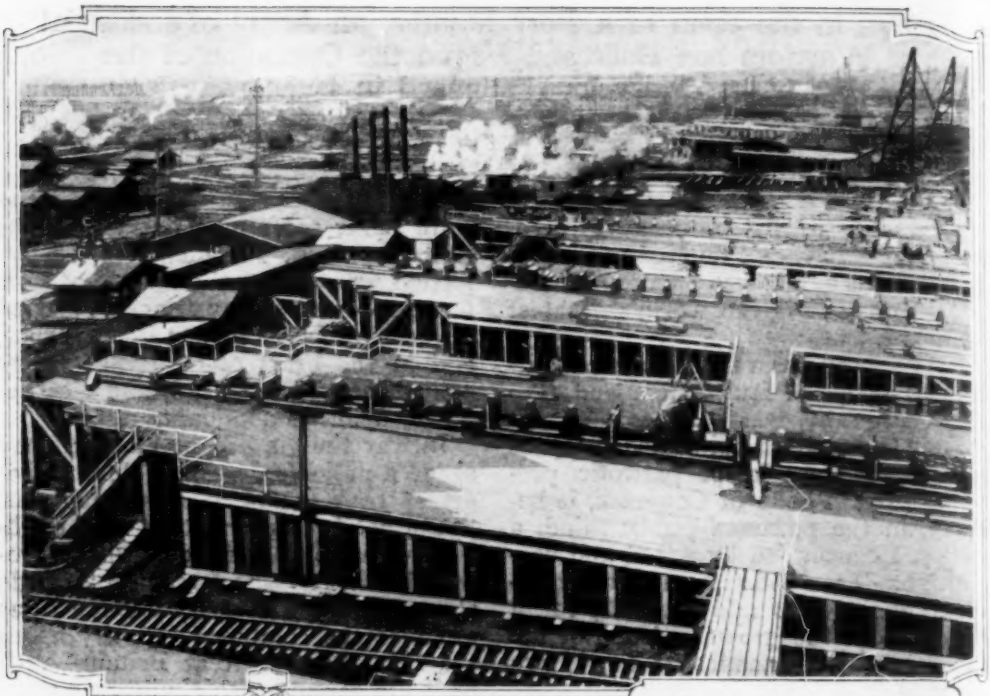
The island is situated in the Delaware River some nine miles from the central part of Philadelphia. Its selection was due to the facts that it is protected from enemy attack, is skirted by deep water, is near a good harbor, and in the heart of a district where skilled labor is plentiful, and electric-power facilities abundant.

In war time, a day or an hour may shape a nation's destinies. The builders at Hog Island have realized this. Speed has been the watchword. Nothing but a world crisis could have produced in a few short months a single shipyard with a capacity one-fourth as great as the combined capacity of all the shipyards in Great Britain—until now the foremost shipbuilding nation of the world!

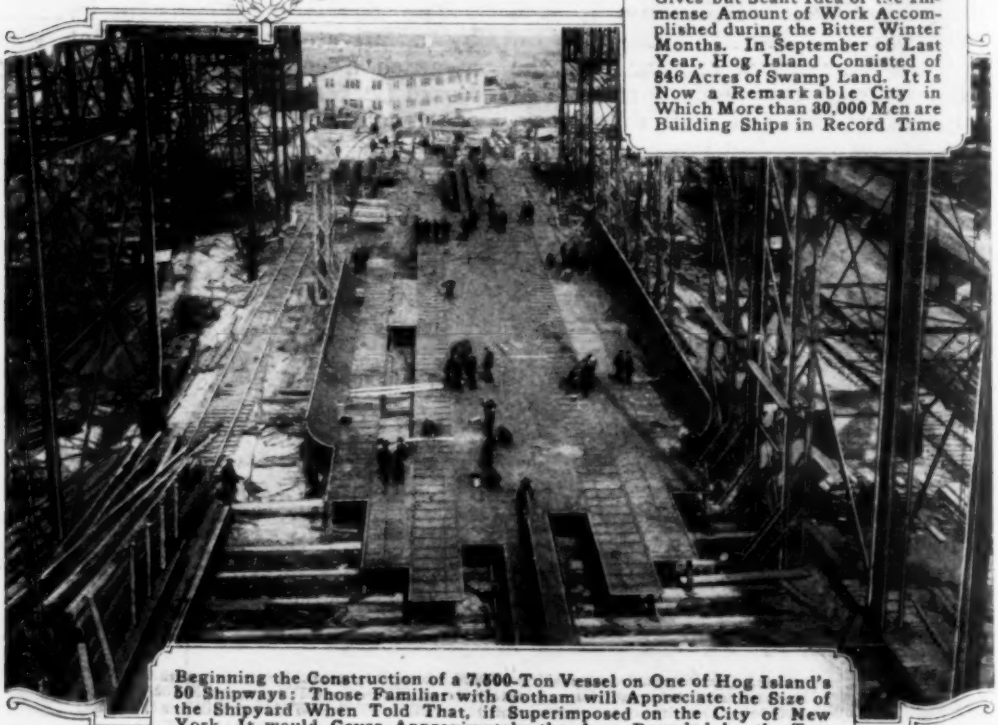
The development was undertaken by a private corporation that was awarded a contract by the Shipping Board September 13, last year, for the construction of fifty 7,500-ton, stand-



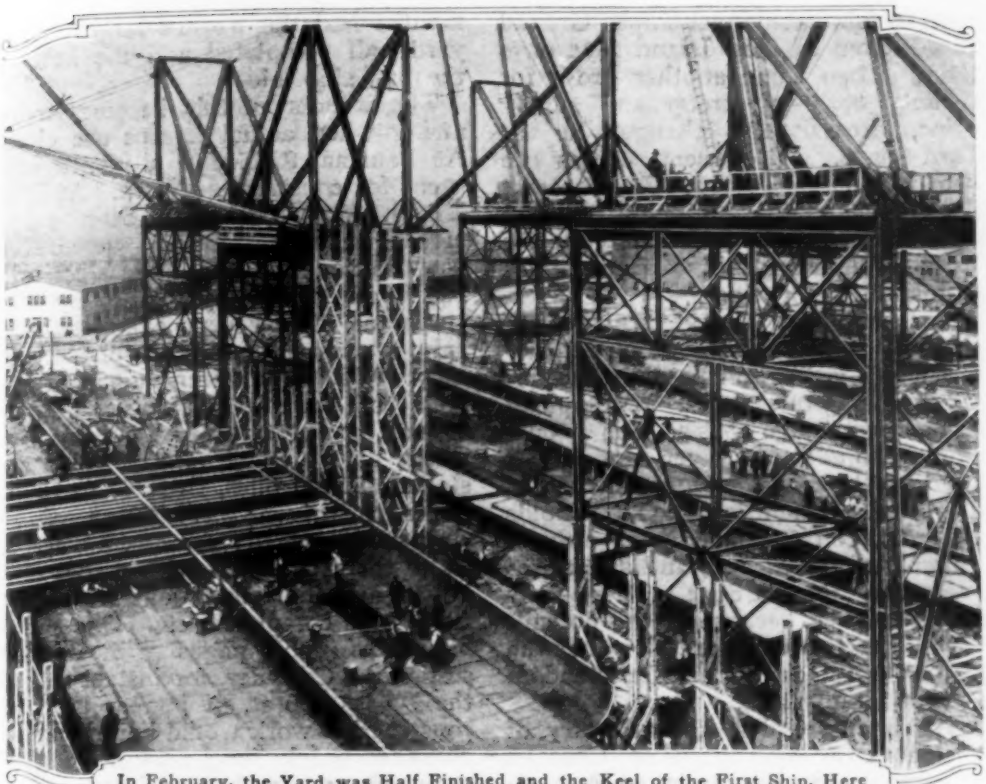
During the Most Severe Part of the Winter, Work Continued without Interruption. This Shows How the Ground was Thawed with Live Steam to Facilitate Excavating and Pile Driving



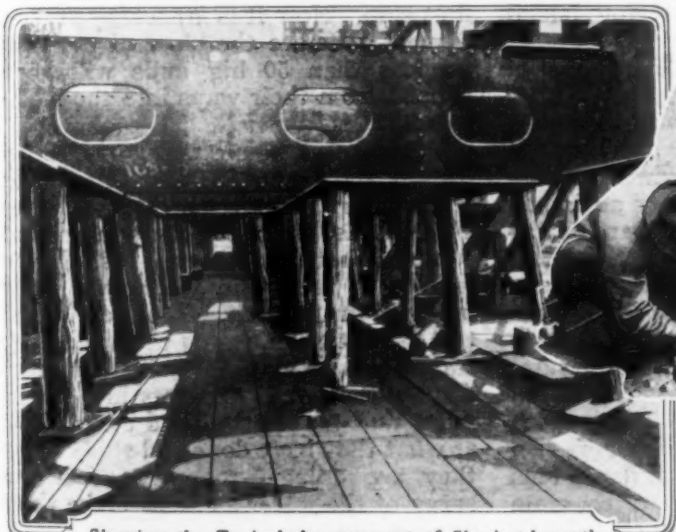
This Picture, Taken Last Spring, Gives but Scant Idea of the Immense Amount of Work Accomplished during the Bitter Winter Months. In September of Last Year, Hog Island Consisted of 846 Acres of Swamp Land. It Is Now a Remarkable City in Which More than 30,000 Men are Building Ships in Record Time



Beginning the Construction of a 7,500-Ton Vessel on One of Hog Island's 50 Shipways: Those Familiar with Gotham will Appreciate the Size of the Shipyard When Told That, if Superimposed on the City of New York, It would Cover Approximately the Area Bounded by the Two Rivers, the Battery, and Eighth Street



In February, the Yard was Half Finished and the Keel of the First Ship, Here Shown in an Early Stage of Erection, was Laid. The Vessel, Christened the "Quistconck," Which Is the Old Indian Name for Hog Island, was Launched the First Week of August. It is Expected That by October First, or Soon Thereafter, Production will Reach Its Highest Point of Efficiency



Showing the Typical Arrangement of Shoring beneath the Tank Bottom of a Ship during Its Assemblage: The Picture Gives a Lengthwise View. Tank Bottoms, It might be Mentioned, are Provided for Ships That Burn Fuel Oil

Cutting Out, with a Carefully Adjusted Torch, Rivets That have Failed to Pass Inspection: Speed Is the Watchword, but Haphazard Workmanship, Although It Occasionally Creeps In, is Not Countenanced

ardized fabricated-steel ships. Ground was broken at Hog Island nine days later. Then came another order for seventy 8,000-ton troop and supply ships, necessitating changes in the yard plans. At present, orders are held for 180 steel ships. The contract for the shipyard and ships involves about $200,000,000 — undoubtedly the largest single contract awarded in the history of the world.

For this work the government reimburses the corporation for all material and labor, and pays a fixed fee for each ship turned out. If computed on a percentage basis, this would amount to about four per cent, by far the lowest price the government has ever paid. In addition, the latter holds an option on the land, pays six per cent rental for its use, and supervises everything that is done. These facts are mentioned because of the prevailing and erroneous impression that the master profiteers of all Christendom feed at Hog Island.

We have heard of the gallantry of our boys at Cantigny, at Chateau Thierry, and in the region of Fere-en-Tardenois. Let us listen to the story of a home guard of 35,000 loyal-hearted and strong-bodied fellows who have been fighting the Hun at Hog Island for almost a year.

From the moment the first shovel of earth was excavated, Sept. 22, 1917, until the present time, work has progressed in almost magic manner. In the face of the severest winter experienced in decades, in spite of an industrial upheaval, a Shipping Board shake-up, a serious railway situation, and vicious attacks, a remarkable city complete in every detail, except for saloons and cemeteries, was raised almost in a nighttime from the midst of a summer breeding place of mosquitoes. In blinding snowstorms and in the teeth of zero winds, men thawed frozen ground with live steam and drove tens of thousands of wooden and concrete piles. They laid a maze of railway tracks, built piers, erected a forest of towers, constructed massive shops and supply depots, and in less than five months had the world's largest shipyard half completed and the keel of the first ship laid!

The wonder of this becomes more awing when actual figures are cited. At Panama, $2,750,000 a month was spent for construction work. At Hog Island, $10,000,000 has been spent monthly. In May, 22 ships were under construction; in June, hulls were taking form on 33 ways. In May, the yard was 80 per cent completed; in July, it was 90 per cent completed. In May, 49,500 ft. of sewer mains and laterals had been laid; 17 miles of permanent and temporary roadway finished; 40,000 ft. of electric cable installed; 90,000 piles, from 60 to 70 ft. in length, driven; 2,200,000 cu. yd. of river mud dredged; 104 towers erected, 74 of them equipped with cranes and hoists, and the foundations for nearly 100 others completed, etc. One could fill pages upon pages with similar statistics. Consider, for instance, that the 105,000,000 ft. of lumber used in construction work would build a plank sidewalk nearly long enough to gird the earth, and one has a glimpse of the Herculean task that has actually been accomplished.

A month ago Hog Island launched its first ship. Now it is launching several a week. Before the close of the year no less than 50 big hulls will have slipped from their ways into the Delaware River.

To make all this possible, workmen braved snow and ice and bitter cold last winter. Hundreds of them froze their hands, their feet, their faces, and some of them gave their lives. If the loyalty of men who work with their hands is in question, go to Hog Island and look at them, watch them handling train loads of material daily, see them driving thousands of rivets in a din of noise that makes the head swim, look at what they have done and study what they are doing — moreover, feel the spray of the water as ships make their maiden plunges.

Some might ask if men are being driven to death like slaves. It is true they are working like slaves. But

the answer of it all is: Spirit, lots of it. Think of fellows working as these men are working, chalking on the sides of the boats they are building such words as, "For God's sake, hurry up!"

The yard has 50 shipways extending for a mile and a quarter along the water front. There are 209 in Great Britain. There are seven 1,000-ft. outfitting piers, each 100 ft. wide and equipped with two railway tracks. Here as many as 28 ships can be equipped and outfitted, even down to table linen and silver, at one time.

The construction and operation of a yard such as this has never been possible before, because there has never in the past been a demand for a great enough number of ships of one standard pattern to warrant the establishment of such a plant. Two types of ships are being built. The steel that goes into them is rolled in some 29 different mills in various parts of the country. Subsequently it is fabricated at 70 other plants into definite, labeled parts that are ready for assembling when unloaded at Hog Island. Altogether more than 3,500 concerns in the United States and Canada are sending their products to this one great shipyard.

The vessels themselves are stanch, seaworthy craft, but in no way notable for beauty. They are flat-bottomed, their sides are straight, and all their lines are such as to aid rapid construction.

Hog Island has training schools where unskilled men and boys are given intensive instruction and in a few days or weeks made valuable workmen. It has its own hospitals, its recreation fields and buildings. It operates restaurants that serve thousands of meals daily without profit. It has an armed guard of 600 men, and a large, well-trained fire department. It goes in for welfare work. In short, it is a complete city without an unemployed man within its confines.

Merchantmen aggregating 8,000,000 tons are now flying the American flag. Think, then, what it means for the Hog Island shipyard to turn out between now and the close of next year, ships totaling approximately 1,500,000 tons.

After the war is won, what then of Hog Island and its invested millions! After the war is won, America is to have a merchant marine!

GAS BAG FOR SIDECAR LIKE AUTOMOBILE OUTFIT

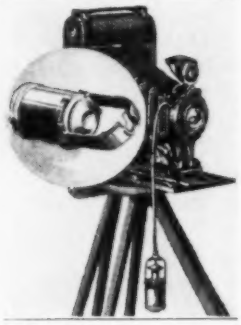
Sidecar combinations in Great Britain are now fitted with coal-gas containers that are no more unsightly or awkward than those installed atop motor cars and busses. Four upright steel bars support a box-shaped railed canopy that holds a medium-sized bag of sufficient capacity for a 10 or 12-mile run. Many outfits such as this are to be seen in the cities and along the smooth highways of rural England.

One Charging of the Coal-Gas Bag Supplies the Combination with Fuel for a 12-Mile Trip

¶Reports show that 5,000,000 women and girls are employed in trades, etc., in the United Kingdom and that the number is increasing at the rate of 15,000 per week, many taking positions formerly filled by men only. Before the war 2,000,000 was the total.

AUTOMATIC DEVICE MAKES CAMERA SELF-OPERATING

It is the rule rather than the exception that the amateur photographer fails to appear in the group pictures he prizes most. To overcome this, an ingenious little instrument has been devised to do the "snapping" for him. It is a small pneumatic cylinder with a plunger that operates the cable release. The device may be timed to act at any desired interval between a half second and three minutes from the instant it is set. Thus, after focusing the camera, the operator is given ample time to join his friends in front of the lens before the exposure is automatically made.

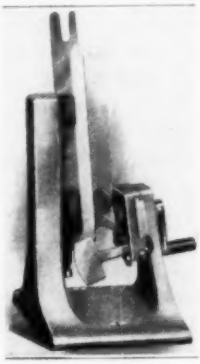


TWENTY-FIVE-TON WHEELS HAULED ON OLD WAGON

The attention of many persons was recently attracted by an out-of-the-ordinary job of hauling undertaken by an eastern carting company. The loads, of which there were 12, each consisted of a cast wheel, 18 ft. in diameter, with a 4-ft. rim and weighing 25 tons. To transport these huge castings a wagon built especially for heavy loads was used, 10 horses and two five-ton trucks being required to draw them over a steep hill. The substantial workmanship in the wagon is attested by the fact that the vehicle has been in use 25 years and on one occasion carried a turbine weighing 65 tons.

SHARPENER FOR KNIVES IN CLOTH CUTTERS

A simple sharpener has been patented which quickly puts a razor edge on the bottom of the cutting member of straight-knife cloth cutters, used by garment workers and others. The sharpener is provided with two arms, with abrasive surfaces projecting from the side of an upright and so attached to the actuating mechanism that their oscillating movement soon puts a keen edge on the lower end of the knife. During the process the latter is clamped to a second upright, also forming part of the framework of the grinder. The front edge of knives of this type has a rougher edge and therefore requires a different grinding instrument.



STEEL-WEDGE WIRE CUTTER TESTED AT CAPITAL

Among the interesting war machines that have been subjected to recent tests, there is an armored wire cutter that was tried out at Washington a few

One of 12 Wheels, Weighing 25 Tons Each, being Drawn on a Wagon Which has Seen 25 Years of Service: While Six Horses Were Sufficient to Pull the Load on the Level, in Going up a Hill 10 Horses and Two Five-Ton Tractors had to be Used

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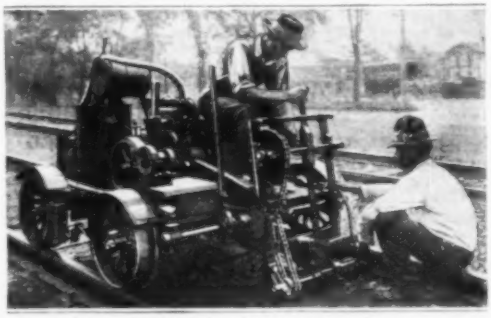
Cutting a Swath through an Entanglement: A Wire-Cutting Machine of Recent Development and Interesting Design. Right: Interior View of the Steel Wedge, Showing Manually Operated Lever That Actuates the Knife Bar Mounted in Front of Prow

weeks ago. It is a wedge-shaped steel shield carried on three wheels and equipped at the prow with a pointed knife bar that cuts wires with great facility when operated manually by means of a lever. The space within the floorless contrivance affords room for one, or possibly two, soldiers. As it is pushed forward and the cutting member actuated, a path is cut through an entanglement with considerable rapidity. It has an advantage, perhaps, in being small, comparatively light, and inexpensive.

RAIL-DRILLING SECTION CAR SAVES MUCH LABOR

Of interest as a labor-saving machine, of possible importance in railroad maintenance, is a motor-driven section car equipped for rail drilling. At one end it is supplied with a drill frame that is so constructed that it may be swung to any necessary position with ease. Under average conditions two men are able to operate the outfit at maximum efficiency, although on busy main lines it is necessary, for the sake of safety, to have flagmen on guard. As many as 307 holes for rail anchors and connections have been drilled with this equipment in a normal working day. Any size of holes, up to 1¼-in. diameter, may be bored. Power is supplied by a 4-hp. gasoline motor that gives the car a speed of about 18 miles an hour. The car com-



The Drills are Cooled with Water That is Conveyed through a Flexible Tube from a Tank Carried at the Rear

plete weighs 1,140 lb. and can be removed from a track in about four minutes by two husky men.

SWEDEN MANUFACTURING CORKS OF PINE

Owing to the scarcity of true cork in Sweden, wooden corks are being used in that country, the substitutes being made from quick-growing pine. This wood has wide annual rings, and one of its characteristics is its tendency to swell somewhat after it has been fashioned into stoppers.

COAL-STORAGE EQUIPMENT LIKE GRAIN ELEVATOR

In a large mid-western industrial city, a 3,000 ton anthracite-coal elevator, composed of a series of cylindrical steel bins approximately 100 ft. in height, has been erected. The loading equipment, consisting of a bucket conveyor which hoists coal from cars to a traveling belt that extends lengthwise across the tops of the bins, has a capacity of 40 tons an hour, including the time spent in switching the rolling stock into position. By means of a series of gates, the coal is discharged into whatever bin is desired, and its fall broken by a series of staggered ledges.

The Conveyor Equipment Provided with This Coal Elevator, of 3,000-Ton Capacity, Transfers Material from Cars to Bins at a Rate of 40 Tons an Hour

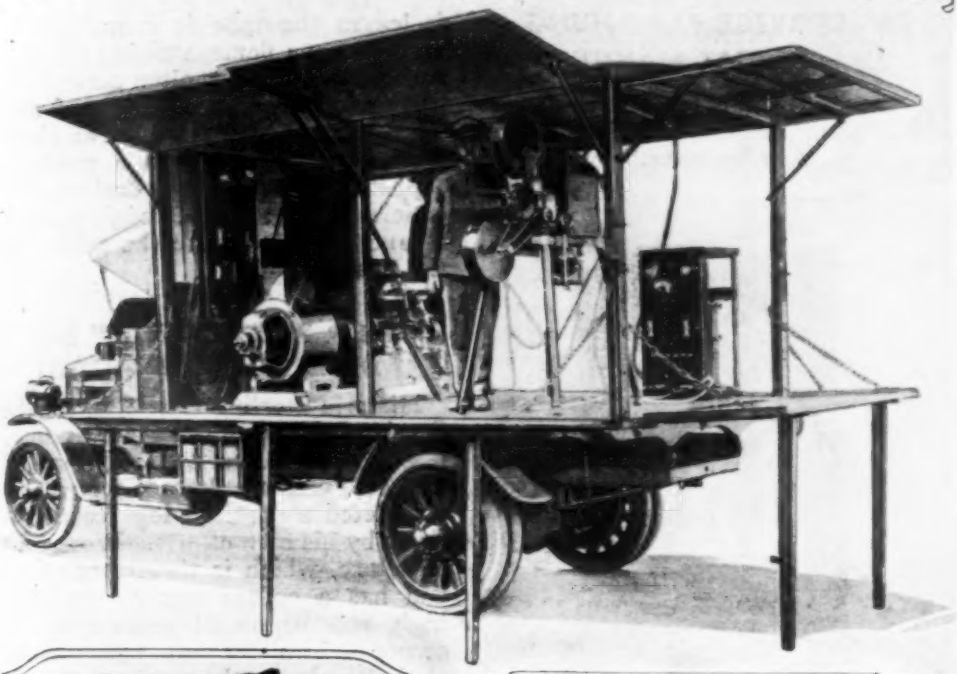
WOULD PUT SAVING OF FAT IN CHARGE OF EXPERTS

It is being earnestly urged that the government appoint experts, to be known as "animal engineers," who would supervise the conservation of inedible fats, and other animal products that are now wasted in this country. It is pointed out that the serious shortage of glycerin existing at present could be largely relieved if the country properly utilized material to be obtained from the bodies of defective horses. From the same and similar sources, our supplies of hides could be replenished. The use of horse meat is strongly urged also, the contention being that the flesh is rich, nutritious, and cheap, and thousands of foreign-born in this country are already accustomed to eating it. If horses were slaughtered systematically as are cattle, that practice would make additional quantities of oats and corn available for human consumption.

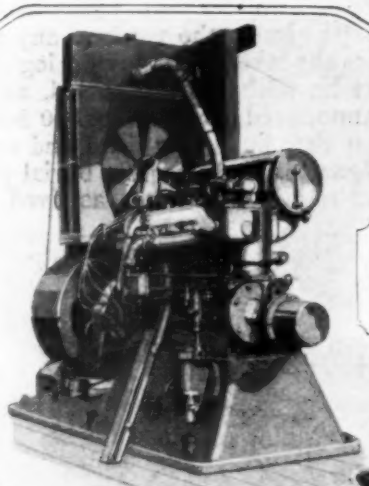
HUN PROPAGANDA FOUGHT WITH MOVING PICTURES

Most satisfactory results are attending a propaganda campaign that is being carried on in England, Scotland, and Wales with the aid of moving pictures. Ten motor trucks originally designed and equipped as portable movie plants for use in Russia by the British Information Department, have been sent out to tour certain districts where pacifists and war-weary sentiments seem to have a hold. Exhibitions of war films are being given in public squares, on village greens, and similar places. Everywhere enormous crowds gather to see the pictures and hear the talks delivered by speakers provided by the government. At many points the whole countryside flocks to the movies, and at every hand the beneficial effects of the work are evident. Fifteen additional outfits are being built so that the scope of the campaign may be enlarged.

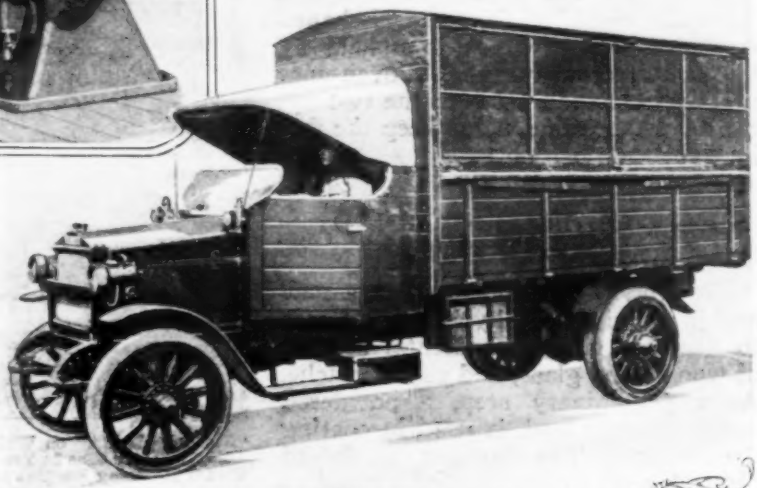
The machines are four-ton trucks with inclosed bodies, the sides and rear ends of which are hinged so that they may be thrown open. In addition to a projector, each is supplied with a generating unit consisting of a four-cylinder, 12-hp. motor directly connected with a dynamo. Of special interest is the fact that pictures as steady as those shown in movie theaters are obtained.



Ten of These Mobile Moving-Picture Outfits Are Now in Use in Certain Districts of England, Scotland, and Wales, Spreading War Propaganda Intended to Counteract Defeatist and Pacifist Sentiments. Fifteen Similar Ones are being Built



The Generating Equipment, Consisting of a 12-Horsepower Gasoline Motor Directly Connected with a Dynamo, is Illustrated at the Side. Although the Projector is Mounted on the Same Foundation, Steady Pictures are Obtained, It is Said



With Its Sides Closed for Overland Touring, the Machine Looks Not Unlike a Moving Van. Hammocks are Provided Inside and Afford Members of the Crew Facilities for Sleeping with the Equipment When En Route or Temporarily Stationed at Some Point

BIG SERVICE FLAG HUNG IN UNUSUAL MANNER

A service flag, notable both for its size and the manner in which it has been hung, has been unfurled in a west-

Service Flag, Measuring 18 by 24 Feet, Hung from an Iron Framework across Which Wire Netting has been Stretched to Keep the Banner in a Vertical Position

ern city. It measures 18 by 24 ft. and contains one large star on which is the number of men who have joined the colors from that city, namely 1,543. It hangs at the end of a business street from the top of an inverted U-shaped iron-pipe frame, which is upheld by two ornamental posts. Woven-wire netting, stretched between the two uprights of the frame, helps keep the flag in a vertical position.

ART OBJECTS ADORNED BY ELECTROLYSIS

Electrolysis is being used in a new and interesting way by a firm in Spain to decorate small ornamental articles of wood, clay, glass, and papier-mâché. As a preliminary step, a powdered metal, usually lead, is used in coating the object. The powder is forced through a jet by compressed air and as it leaves the tube it is melted by a oxyhydrogen flame, striking the object to be treated in a molten state and incasing it in a thin covering of metal. The article is then placed in an electrolytic bath and receives a coating of copper, silver, or gold, as desired. Glass articles are first made rough by use of a sand blast to insure the adhesion of the baser metal.

QUEER LOG "CASTLE" BUILT BY HERMIT, UNAIDED

Historic Sterling Castle, in southern Scotland, has a duplicate in name, if not in design, on White Otter Lake, Ontario, where a hermit has recently completed a spacious log "castle," entirely by his own efforts. Work on the structure, which is three stories high, and has a corner tower four stories high, was begun 14 years ago. The owner and builder would allow no one to assist him in the work in any way. Across the lake he has built a log tomb where he wishes to be buried, and he has announced a reward of $50 for the person that finds him dead and safely consigns his body to this burial place in the region where he has lived.

"Sterling Castle," on White Otter Lake, Ontario: This Structure Was 14 Years in Building, the Hermit Owner Allowing No One to Assist Him in Rearing His Strange Abode

HISPANO-SUIZA MOTOR WORK OF ONLY THREE MONTHS

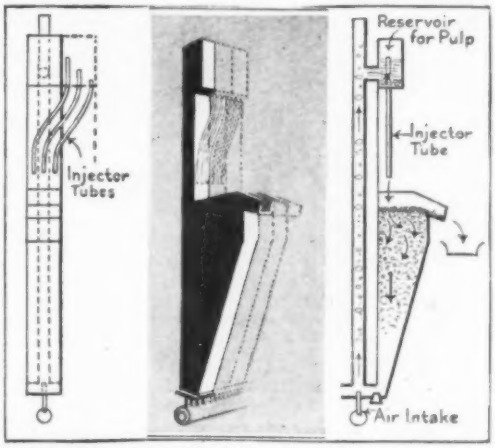
France's premier "ace," Georges Guynemer, attained his crowning triumphs as the pilot of a Spad biplane. This machine, now world-famous, represents the master effort of the engineer who some years ago designed the Deperdussin monoplane, which in a few months gave France the place of honor in the aeronautical world. The Spad attained its present degree of excellence when equipped with the Hispano-Suiza motor. The romances of Guynemer, the ace; of Bechereau, who built the Spad, and of Birkigt, the Swiss inventor of the great aviation engine, might be linked together to form the most enthralling chapter in the history of France's conquest of the air.

Here, however, we are concerned with the brief story of an engine that made a great aeroplane greater, and a great airman—for a time—ruler of the skies. Translated into English, the motor is the "Spanish-Swiss." Its builder gained international attention some years ago as the designer of the Hispano-Suiza motor car, the first high-grade machine developed to master the racking roads of Spain. War closed the automobile factory he established near Paris, and in Barcelona he awaited the return of peace.

As respite from idleness, Birkigt began designing a V-type, water-cooled aeroplane engine with aluminum cylinders. At the time France, possessed of three air-cooled engines of limited power, was in dire need of a greater motor than the German Mercedes. Surprising as it seems, it was only 90 days after setting about his work that Birkigt tested his first motor. Later, in Paris, it successfully passed a 50-hour full-load test and was accepted by the French government. Last January more than 40,000 of these remarkable engines had been produced. Compared with the Mercedes, the Hispano-Suiza has 400 parts instead of 900. Also it weighs a third less than the German unit.

SIMPLE CASCADE MACHINE FOR ORE FLOTATION

A miner has recently devised a cascade apparatus for froth flotation in which mechanical appliances for giving

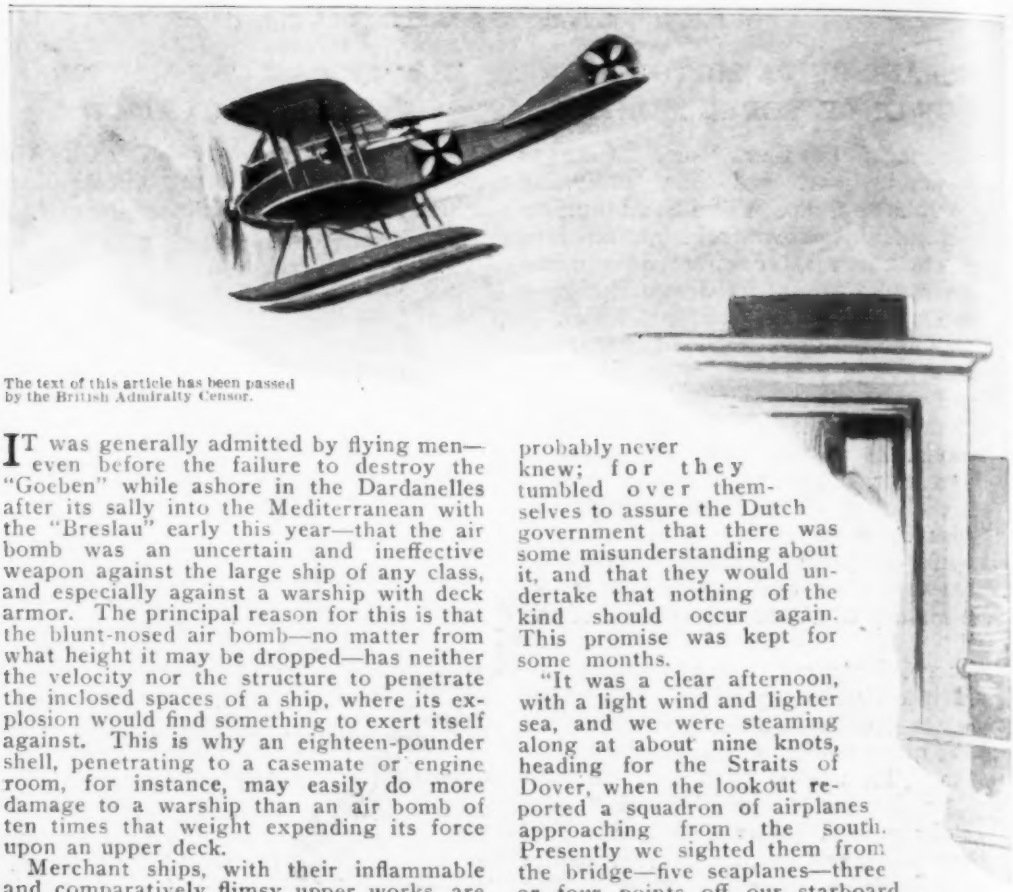


COURTESY OF MINING & SCIENTIFIC PRESS

Diagrams Show Front and Side View of New Apparatus for Ore Flotation, While in the Center Are Three Units Arranged Side by Side, Each Backed by a Like Unit Not Shown Here

force to jets of pulp are eliminated, and at the same time a large amount of head room is not needed as in cases where agitation is caused by gravity. A machine for commercial use is made up of several pairs of units, placed back to back, each operating in the same manner and so connected that the pulp passes from one cell to the next, thus affording numerous chances for each particle of valuable metal to be floated. Each unit consists of a "funnel box," into which a jet of pulp is forced by gravity from a reservoir above. By means of a channel which passes downward from the funnel box and joins to air lifts that extend up to the reservoir, the pulp is kept in circulation, air injected at the bottom of the circuit aiding in the process. With this machine no drop is required between the cells and, as stated, the head-room requirements are reduced to a minimum.

¶An aircraft company in England is reported to be making plans to place on the market after the war a standardized aeroplane that will sell for five hundred dollars.



The text of this article has been passed by the British Admiralty Censor.

IT was generally admitted by flying men—even before the failure to destroy the "Goeben" while ashore in the Dardanelles after its sally into the Mediterranean with the "Breslau" early this year—that the air bomb was an uncertain and ineffective weapon against the large ship of any class, and especially against a warship with deck armor. The principal reason for this is that the blunt-nosed air bomb—no matter from what height it may be dropped—has neither the velocity nor the structure to penetrate the inclosed spaces of a ship, where its explosion would find something to exert itself against. This is why an eighteen-pounder shell, penetrating to a casemate or engine room, for instance, may easily do more damage to a warship than an air bomb of ten times that weight expending its force upon an upper deck.

Merchant ships, with their inflammable and comparatively flimsy upper works, are more vulnerable to air bombs than warships, but even of these very few have been destroyed by aerial attack. Some of the gamest fights of the war on the sea have been those of merchant skippers who, in the days before their ships had guns of any description to keep air craft at a distance, brought their vessels through by the exercise of the unlimited resource which characterizes their kind, usually by sheer skill in maneuvering.

A remarkable instance of this kind I heard of a few days ago from a Royal Naval Reserve officer who figured in it.

"I was in a British ship, temporarily in the Holland-South American service," he said, "and we were outward bound from Rotterdam after discharging a cargo of wheat from Montevideo. It was before the Huns had raised any objection to ships bound for Dutch ports using the direct route by the English Channel. Except for the comparatively slight risk of encountering a floating mine, we reckoned we were just about as safe in the North Sea as in the South Atlantic. Of course, we carried no gun of any kind. No heavy gun, I mean. We did have a rifle or two, as I will tell you of presently.

"Why the attack was made we never learned. In fact, the Germans themselves probably never knew; for they tumbled over themselves to assure the Dutch government that there was some misunderstanding about it, and that they would undertake that nothing of the kind should occur again. This promise was kept for some months.

"It was a clear afternoon, with a light wind and lighter sea, and we were steaming along at about nine knots, heading for the Straits of Dover, when the lookout reported a squadron of airplanes approaching from the south. Presently we sighted them from the bridge—five seaplanes—three or four points off our starboard bow. There had been reports of noonday raids on Calais, and I surmised that these were Hun machines returning from some such stunt even before they were near enough for me to discern their markings with a glass.

"Holding to its course, the squadron passed over us, a mile or more to starboard, and it was already some distance astern when I saw one machine—I think the one leading the 'V'—detach itself from the others and head back in our direction. There was nothing out of the way in this, since every ship was held in more or less suspicion by both belligerents, and it seemed to me so right and proper that the chap should come and have a look at us, that I did not think of calling the 'Old Man' to the bridge, or even send him word of what I took to be a passing incident.

"Descending swiftly as he approached, the Hun passed over the ship diagonally at a height of 600 or 800 feet. 'That'll end it,' I thought; 'our marks and the fact that we're in ballast ought to satisfy him.' But no. Back he comes. This time he was a hundred feet or so lower, and flying on a line directly down our course, passing over us from bow to stern. Again he swung round and repeated the maneuver in reverse, this time at a height of not more

BOMBED!

By Lewis R. Freeman

"'I saw a small dark object detach itself from the fuselage and come directly toward us, almost as though shot from a gun.'"

than 400 feet. He had done this five or six times before it occurred to me that he was taking practice sights for bombing, but not even then did it occur to me that he was doing anything else. It was at the next 'run' or two that the thing began to get on my nerves, and I called up the skipper on the 'voice pipe.'

"The Old Man—he had sailed to the Rio de la Plata for many years and so picked up a good many 'Spigotty' habits—was in the middle of his afternoon *siesta*, but he tumbled out and came puffing up to the bridge on the double. He was no more inclined to take the thing seriously than I, but—on the off-chance, which your careful skipper is always thinking of in the back of his brain box—he rang up 'more steam' on the engine-room telegraph and ordered the quartermaster to start zigzagging.

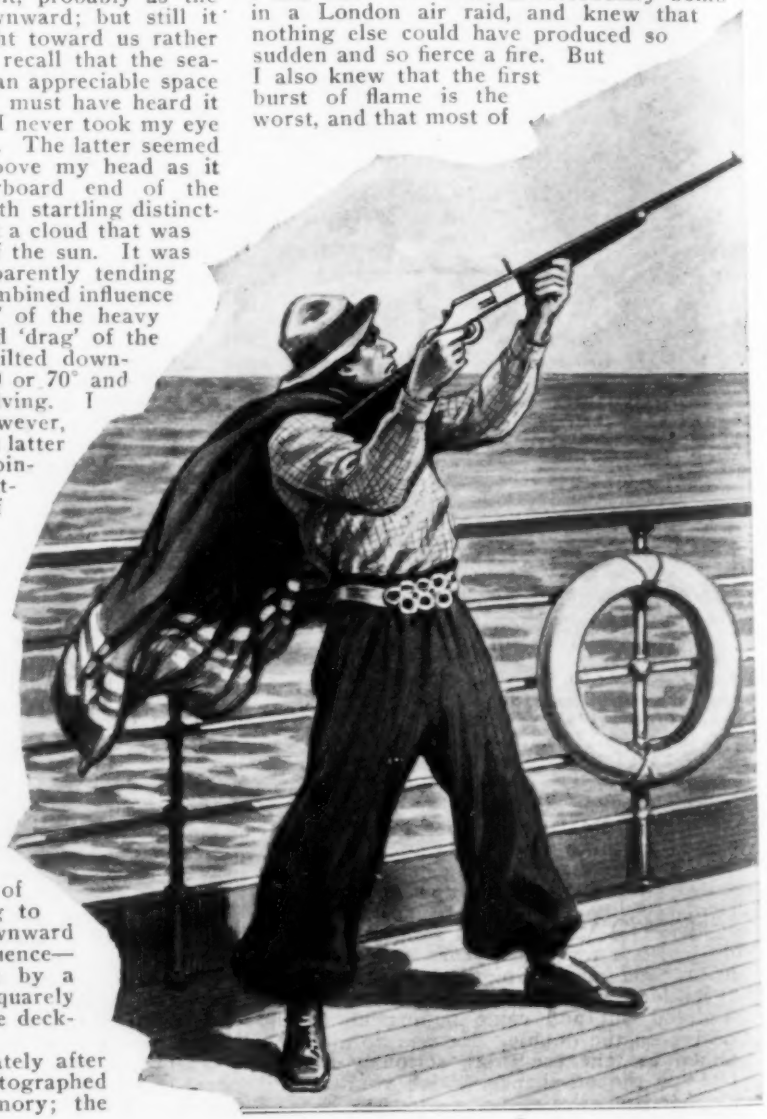
'If he's just trying his eye,' said the Old Man, 'it'll give him all the better practice, while if he's up to mischief it may fuss him a bit.'

"The Hun had just whirled about, three or four cable lengths ahead of us, when the smoke rolling up from the funnel and the swinging bow must have told him that we were trying to give him a bit more of a run for his money. Circling on a wider turn, he came charging straight down the line of our new course, flying at some two or three times the height of our masts. We were looking at the machine at an angle of about 45°—so that he must have been about as far ahead of us as he was high, say, a hundred yards—when I saw a small dark object detach itself from the fuselage and come directly toward us, almost as though shot from a gun.

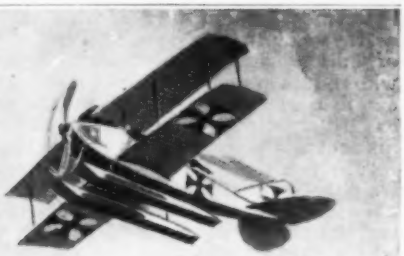
"It was the only bomb I ever saw fall while I was in a sufficiently detached state of mind to mark what it looked like. Fall hardly conveys a true picture of the way the thing seemed to approach, for the swift machine, speeding at perhaps a hundred miles an hour, must have imparted, at the instant of release, a good deal more lateral velocity than gravity could give it vertical in the short distance it had to descend. At first it seemed to come almost head-on, and, greatly foreshortened, looked so much like a round sandbag that the skipper took it for some kind of a practice dummy. 'Probably a dud,' I remember him saying, 'but don't let it hit you. Stand by to duck!'

"My next recollection is of the thing beginning to wobble a bit, probably as the nose began to tilt downward; but still it seemed to come straight toward us rather than simply falling. I recall that the seaplane passed overhead an appreciable space before the bomb; but I must have heard it rather than seen it, for I never took my eye off the speeding missile. The latter seemed from 50 to 100 feet above my head as it hurtled over the starboard end of the bridge, and I saw it with startling distinctness silhouetted against a cloud that was bright with the light of the sun. It was still wobbling, but apparently tending to steady under the combined influence of the downward 'pull' of the heavy head and the backward 'drag' of the winged tail. It was tilted downward at an angle of 60 or 70° and appeared to be revolving. I have since thought, however, that I may have got the latter impression from a 'spinner' that is often attached to this type of bomb to unwind, with the resistance of the air, and expose the detonator. I can imagine a bomb like this falling like a plummet after it had dropped a thousand feet, but this one had not found its 'air legs' yet, and was reeling like a drunken man. Not that it made any difference in its effectiveness, though. It whanged against some of the rigging of the foremast—seeming to deflect inboard and downward slightly as a consequence—missed the mainmast by a few feet, and struck squarely against the side of the deckhouse on the poop.

"The scene immediately after the explosion is photographed indelibly on my memory; the events which followed are more of a jumble. The detonation was a good deal less sharp than I had expected, and so was the shock. The latter was not nearly so heavy as that from many a wave that had crashed over her bows, but, coming from aft rather than forward, the jolt had a distinctly different 'feel.' It was the flash of the explosion—a huge spurt of hot red flame—that was the really astonishing thing. It seemed to embrace the whole after part of the ship, and everything one of the forked tongues of fire was projected against burst into flame. The ramshackle deckhouse, which had been reduced to kindling wood by the explosion, roared like a furnace in the middle of the poop. Even the deck itself was blazing. I had once been near an incendiary bomb in a London air raid, and knew that nothing else could have produced so sudden and so fierce a fire. But I also knew that the first burst of flame is the worst, and that most of



the fire came from the inflammable stuff in the bomb itself. As I had always heard that sand was better than water in putting out a fire of this kind, and knowing we carried several barrels of it for scrubbing the decks, I ordered it brought up and thrown on the flames, but stood by on the bridge myself in case the skipper, who was bawling down the voice pipe for more steam, needed me for anything else. Luckily, the sand was close at hand, and they were scattering it from buckets over the blazing deck within a minute or two. Except for the débris of the deckhouse, the fire was put out almost as quickly as it was started, when suddenly the Hun, whom I had almost forgotten in the rush of undoing his dirty work, flashed into sight again. The skipper had her zigzagging so short and sharp by this time that her wake looked like the teeth of a big saw, and this the Hun was unable to follow closely enough to get a fore-and-aft sight down her as he had done the first time. Coming up astern, he kicked out a bomb just before he was over her port quarter, but it only shot across diagonally and struck the water to starboard, about a hundred feet away and about even with her funnel. It went off, with, if anything, a sharper crack than the one which had struck the poop, and the geyser the explosion shot up flashed a bloody red for the instant the water took to chill the glow of the molten thermit. Vanishing even more quickly was a ragged red star which fluttered for a moment beneath the water itself as the flame stabs shot out in all directions from the central core of the explosion. No water was thrown aboard and, near as I was to the explosion, the rush of air could hardly be felt. Something that came tinkling down after striking the side of the chart house, however—I picked it up after the show was over—turned out to be a thin fragment of the casing of the bomb. A similar fragment, twisted into peculiar shape, struck the chest of a man leaning over the rail in the waist of the ship, inflicting a flesh wound the shape of a ragged letter 'C.' As the chap's name chanced to be Coombs, he was quite proud of the 'initial' scar. ''Oo'd 'a thought the blinkin' 'Un know'd ernuf tu brand me wi' the c'rect letter?' he was always saying afterward.



"'A minute or two later I saw him, legs wide apart to keep his balance, pumping back at the Hun, who had swung close again in the interim, with a rifle, a weapon which I later learned was an old Winchester which had been rusting on the wall of his cabin ever since the ship had been in the bêche de mer trade in the south Pacific.'"

"That any kind of a man could really be trying to destroy a merchant ship in cold blood seemed to me so monstrous, so utterly impossible, that, until the second bomb was dropped, I was almost ready to believe that the first had been launched by accident. From then on we knew it was a fight for life. The Hun took a broader swerve in bringing his machine round for the next charge, and, anticipating our next shift of course, came darting down on an almost straight fore-and-aft line again. The sudden cloud of our fore-blown smoke—there was a following wind on the 'leg' they had put her on at the moment—which engulfed him at the instant his third bomb was released, was the one thing in the world that could have made him miss so easy a 'sitter.' The quick 'side flip' the sharply banked plane gave to the missile threw it wide by twice the distance the second had missed us. Though the detonation rang sharp and clear—it was an explosive, not an incendiary, bomb this time—and though a vicious spout of foam shot up, I could note no effect of the thing on the ship. Whether that was his last bomb or not, we could never be quite sure. At any rate, it was the last he tried to drop upon us—or upon any other ship for that matter.

"Just why he returned to the attack with his machine gun we could only guess. Perhaps he was at the end of the small number of bombs left from the raid he was doubtless returning from, or it may have been that he was angered by his two misses. Again, it is just possible that the fact that the fire was being got under control on the poop impelled him to adopt an attack calculated to drive the plucky chaps who were fighting it to cover. Anyhow, flying just high enough to clear the tops of the masts, he came swooping back, and it was upon

these men he concentrated his attack. Two or three of them I saw fall under the rain of bullets, among these our freight clerk, who had also been knocked down by the explosion of the first bomb, but who, being hardly stunned by the shock, was soon on his feet again and leading the fire fighters.

"He was a good deal of a character, this freight clerk. Although well educated, he had led a sort of roustabout existence in various parts of the world, usually a corner where fighting was on. For a year previous to the war he had been a *gaucho*, or cowboy, on an *estancia* of the Pampas, and some queer trait in his character made him still cling to the *poncho* and *bombachos*—baggy trousers—which are the main features of the Argentine cow puncher's rig-out. It was comical enough to see him strutting about in these strange garments on shipboard, but as officers of any kind were scarce, and as he did his work well, the skipper had never insisted on putting him into uniform.

"He was scarcely more hurt the second time than the first, but the bullet, which had grooved the outer covering of his brain box, seemed also to have put a new idea inside of it. I saw him pull himself together in a dazed sort of way after the plane had passed, then shake off the hand of a man who tried to help him, and dash off down the ladder, tumbling to cover, I thought. But a minute or two later I saw him, legs wide apart to keep his balance, pumping back at the Hun, who had swung close again in the interim, with a rifle, a weapon which I later learned was an old Winchester which had been rusting on the wall of his cabin ever since the ship had been in the *bêche de mer* trade in the south Pacific. He appeared to have had the worst of the exchange, for when I looked again he was sitting, with one leg crumpled crookedly under him, propped up against a bit. He looked full of fight, though, and seemed to be replenishing the magazine of the rifle from his bandoleer. The skipper sent me below to stir things up in the engine room at this juncture, and I did not see my *gaucho* friend until he had fought two or three more unequal rounds and was squaring away, groggy but still unbeaten, for what proved the final one.

"I don't know whether he ever got credit for it or not, but the Old Man's plan of action at this juncture must pretty nearly have marked a milepost in merchant-ship defense against aerial attack. We had been instructed in and practiced the zigzag before this, but that was about the limit of our resources in this line. 'Squid' tactics—smoke screening—had hardly been more than thought of for anything but destroyers. Yet the wily old skipper brought off a stunt that could not have been improved upon if it had been the result of a year's thought and experience.

"The instant the Hun 'stumbled' when he struck the cloud of smoke that was pouring ahead of us, the skipper's ready mind evolved a plan still further to besmudge the atmosphere. I heard him yelling down the engine-room voice pipe to 'smoke up like b——y hell!' About all the chief could do under the circumstances was to stoke faster and cut down the draft. This he did; but—principally because the coal was a rather lumpy lot instead of the fine dust which gives the best results—the 'screen' did not bear much resemblance to one of those almost solid streams of soot a modern destroyer can spew up by spraying oil freely and shutting off the air. Such as it was, however, the Old Man made the most of, and by steaming 'down the wind' accomplished the double purpose of cutting down the draft, fanning the fire on the poop, and keeping a maximum of smoke floating above the ship.

"The smudge bothered the Hun, but by no means put an end to his machine-gun practice. Except for the freight clerk, who was still pumping back at the seaplane every time it swooped over, every one on the poop had been killed, wounded, or driven to cover, and, with no one to fight it, the fire was beginning to gain new headway.

"'Not good 'nuf by a mile,' I heard the Old Man muttering to himself as he eyed the quickly thinning trail of smoke from the funnels. Then I saw his bronzed old face light up with the look of a man who has a sudden idea.

"'X——!' he shouted, beckoning me to his side; 'duck below, clean out all the stuff in the paint lockers and chuck it in the furnaces, 'specially the oils and turps. Jump lively.'

"Linseed oil, turpentine, and some tins of fine lubricants—I had them all tumbled out of the forepeak and carried, rolled, dragged, or tossed down to the stokehold. Most of the stuff was in kegs or cans small enough to go through a furnace door, and these we threw in without broaching them. The Old Man called me up twice—the first time to say that there was no increase of smoke, and wanting to know 'why in hell' I was so slow, and the second time to say that he had just got a bullet through his shoulder and ordering me to come up and take over, as he was beginning to feel groggy.

"There was an ominous crackling and sputtering in the furnaces as I sprang for the ladder, and before my foot was on the lowermost rung one of the doors jumped violently up on its top-swung hinges from the kick of an exploding tin or keg of oil. As it fell back with a clang the 'swish' of sudden flame smote my ears, and then a regular salvo of muffled detonations. The last picture I had of the boiler room was of the stokers trying to confine the inferno they had created by wedging shut the doors with their scoops.

"The whole ship was ashiver with the roaring conflagration in her furnaces as I reached the upper deck, and above a tufty, white frizzle of escaping steam rolled a

greasy jet of smoke that looked thick enough for a man to dance a hornpipe on. I found the Old Man, with a dazed look in his eyes and his jaw set like grim death, hanging on to the binnacle when I gained the bridge, and all he had the strength to say before sluddering down in a heap was, 'Damn good smoke. Carry on—zigzag down wind. Think blighter finish. Look to—fire.'

"The fact that the Hun was now circling the ship at a considerable distance had evidently made the skipper believe that he had come to the end of his cartridges, and in this I think he was right. Which fire he referred to I was not quite sure, for I was rather more concerned about the one I had started with the ship's paint than the one the Hun's incendiary bomb had set going. The *gaucho* was still snuggled up against the bit, which he used to rest his right elbow on in the occasional shots he was lobbing over at the now distantly circling enemy. When I learned later what a crack shot the chap really was I cannot say that I blamed the Hun for his discretion.

"What tempted him to make that fatal final swoop we never knew. It may have been sheer bravado, or again, he may have been trying to frighten off the fire fighters again. Anyhow, back he came, allowing plenty of leeway to miss my 'smoke screen.' The *gaucho* saw him coming, and I can picture him yet as he lay there waiting, with his cheek against the stock of that old Winchester, following the nearing plane through its sight. With the good sense of your real hunter, he didn't run any risk of frightening off his quarry—now that it was coming in fair range—with any premature shots.

"If the Hun had been content to sit tight the chances are nothing would have happened to him. But the temptation to have a closer look at his handiwork, and to jeer at his 'beaten enemy,' was too much for him. Banking as sharply as the plane would stand, he leaned out above the wrecked poop, gave a jaunty wave of the hand and opened his mouth to shout what was probably some sort of Hunnish pleasantry.

"The crack of the Winchester reached my ears above the roar of the seaplane's engine, and the next thing I was clearly conscious of was the machine's swerving, sidewise and downward, and plunging straight into the trailing column of black smoke. The tip of its left wing fouled the main truck, but it still kept enough balance and headway to carry past and clear of the ship. It slammed down into the water two or three hundred feet off our starboard bow, and it only took a point or two of alteration to bring it under our forefoot. The old ship struck the mark so fair that she cut the wreckage in two, and I saw fragments of wings and fuselage boiling up on both sides of our wake.

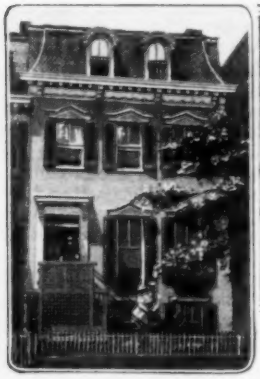
"Of course we never knew definitely who was responsible for polishing off the Hun. For a while I thought it probable that the *gaucho* had only wounded him, and that his swerve into the smoke had been responsible for the dive into the sea, where the ship put the finishing touches on the job. But from the day that the *gaucho* showed me that he could hit tossed-up shillings with a target rifle four times out of five, I have been inclined to believe his assertion that he 'plunked the bloomin' blighter straight through the nut,' and that I and my smoke had nothing to do with it.

"Neither the skipper nor the *gaucho* were much hurt, and as for the ship, she probably suffered in the long run more from the loss of her paint and oil supply than from the Hun's bomb and the fire that it started."

"'The whole ship was ashiver with the roaring conflagration in her furnaces as I reached the upper deck, and above a tufty, white frizzle of escaping steam rolled a greasy jet of smoke that looked thick enough for a man to dance a hornpipe on.'"

HOME BECOMES CAFETERIA FOR WAR WORKERS

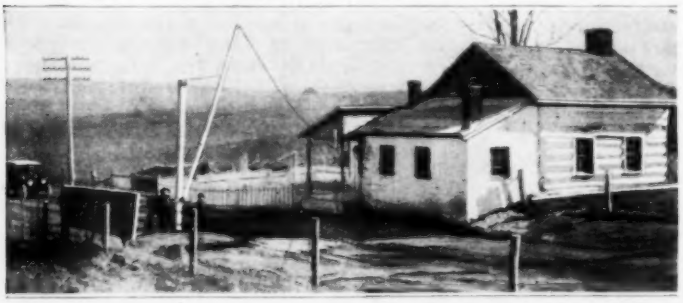
To aid in providing ample and easily accessible eating accommodations for many war workers of the Department of Agriculture, at Washington, an association of alumnæ of a woman's college has secured an old brick residence much nearer to the department than the down-town restaurants, and has transformed it into a most attractive cafeteria, with tea-room features added. The main dining room, furnished with rustic chairs and tables, and dainty curtains, is supplemented by a tent house in the yard at the rear. This outdoor eating place is entirely screened in, and is reached from the house by descending a flight of vine-covered steps. It has a brick floor, and inclosed within its walls are several trees and shrubs that add to its attractiveness.



Old Washington Residence Transformed into a War Workers' Cafeteria, and a Glimpse of the Attractive Open-Air Dining Room Fitted Up at the Rear of the House

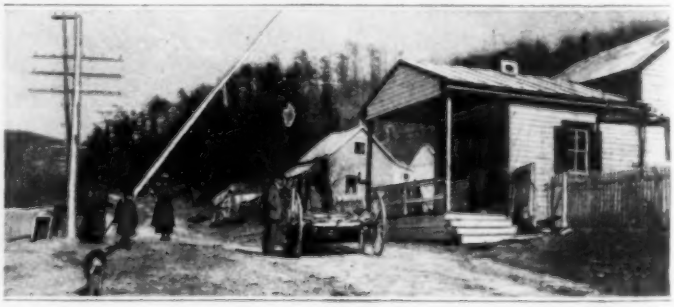
ABOLISH MANY TOLL GATES ON OLD HIGHWAY

An instance of the abandonment of toll gates, which is particularly gratifying to motorists, is found on a highway extending across Franklin County and into adjoining counties in southern Pennsylvania.



Old Toll Gate, Recently Abandoned, West of Waynesboro, Pennsylvania

On a stretch of about 40 miles, there were formerly eight toll gates, which necessarily were a source of annoyance to all persons using this thoroughfare—one of the main arteries of travel from Baltimore and Philadelphia to the west. After persistent agitation by a motor club whose members frequently used this road, the state and county authorities were induced to purchase it, the price being $49,000. As soon as the road became public property the toll gates were abolished.



This Toll Station, near Rouzerville, Pennsylvania, Was One of Eight to be Put Out of Commission through Agitation by Motorists

GARABED TO BE TRIED AGAIN

By GEORGE A. WALTON

From an interview with Garabed T. K. Giragossian

WITH perfect confidence in the success of his invention to utilize the "free energy" in the air, Garabed T. K. Giragossian, the Boston inventor whose apparatus was examined by a committee of scientists for our government and unfavorably reported on early in July, is constructing a working model to be placed before another committee of scientific men this fall.

Not a word of criticism came from the inventor, in my interview, of the body of men whom he failed to convince. Congress has passed the bill giving the inventor the privilege of as many demonstrations as he may desire. With his confidence in the invention unshattered and backed by loyal friends, he has gone into his workshop with his two associates determined to show the world that Garabed is what he claims. And as to the eventual outcome, he said to me, "I am confident that I will justify the action of congress in establishing the practicability of it beyond any possible objection or dispute."

It is just a year ago that Mr. Giragossian appeared before congressional committees and made a most profound impression with his story of a marvelous discovery which he wanted to demonstrate under government protection, and a resolution providing for a test under the auspices of the secretary of the interior was passed by both houses of congress.

The inventor claimed to have discovered a method, or made an invention, by which unlimited energy can be produced without expense or without toil, except wear and tear of machinery, which is inevitable in every kind of running machinery. It has no connection with perpetual motion, nor did he claim to have overcome gravity or anything of that kind. His device will be utilized in such a way that it is almost condensed energy. The source of the energy is very great and is portable. The engine, he claimed, could be put into any room, in any cellar. It does not require any heat. With motion one can get electricity.

Seated in a friend's office, Mr. Giragossian, when asked if he expected to continue his work, replied that even now he is at work on the apparatus that he will demonstrate in the fall. And the same secrecy that has hidden from view his experiments in the past, will still conceal the preparation of this working model with which he hopes to convince his jury. When asked the reason for his continued secrecy, he replied, "I am responsible to the government in maintaining this secret, whether it is adjudged a failure or a success."

The inventor is an earnest, sincere sort of man whom one has to know but a few minutes to admire. He is also a wonderfully well-read man whose whole life ambition is to perfect his machine.

"What good is a boiler filled with steam to look at?" he asked me. "It's no good unless you can harness it. When the board of scientists came to see me, I demonstrated the principle only. I am now constructing this working model to demonstrate the success of my invention. This use of free energy is bound to come sooner or later. It will be the rising generation that will give the real judgment and show others they have been wrong."

And so, bound up in his secret, Garabed Giragossian is working day and night on the model to show and demonstrate before the next gathering to pass on it.

Of the possibilities of Garabed, as he calls his invention, much has been written. If it can be worked out on a practical basis, it will mean that our battleships can remain at sea indefinitely, self-reliant and independent of fuel supplies. Airplanes may remain in the air for weeks without regard for fuel supplies, and automobiles may run for thousands of miles without having to stop for gasoline or oil. No enemy could combat a nation which was entirely independent of a fuel supply, and its success would mean the war's quick ending.

Since the test was made, Mr. Giragossian has received many letters from noted persons who are in sympathy with his work, and who, if he so desires it, will come to Boston with scientists to attend the next demonstration. Some of these men have seen his machine and are confident of its success, and stand ready to protect him in his demonstration in October.

LIGHTED RED CROSS TOWER ERECTED IN MANILA

In a recent carnival in Manila, P. I., an illuminated Red Cross tower furnished striking evidence of that far-away city's interest in war activities. The structure is 225 ft. high, and it will be observed that each of the panels into which the tapering sides are divided is marked with a red cross, suitably outlined with electric bulbs. Beneath the lantern, facing in four directions, are four lighted wheels bearing the initials of the electric company that erected the display.

Electric Tower, 225 Feet High, Erected in Manila: The Red Crosses Adorning the Sides of the Tall Structure Effectively Advertised the Cause They Represent

SWISS ROAST MAY BUGS FOR CHICKEN FEED

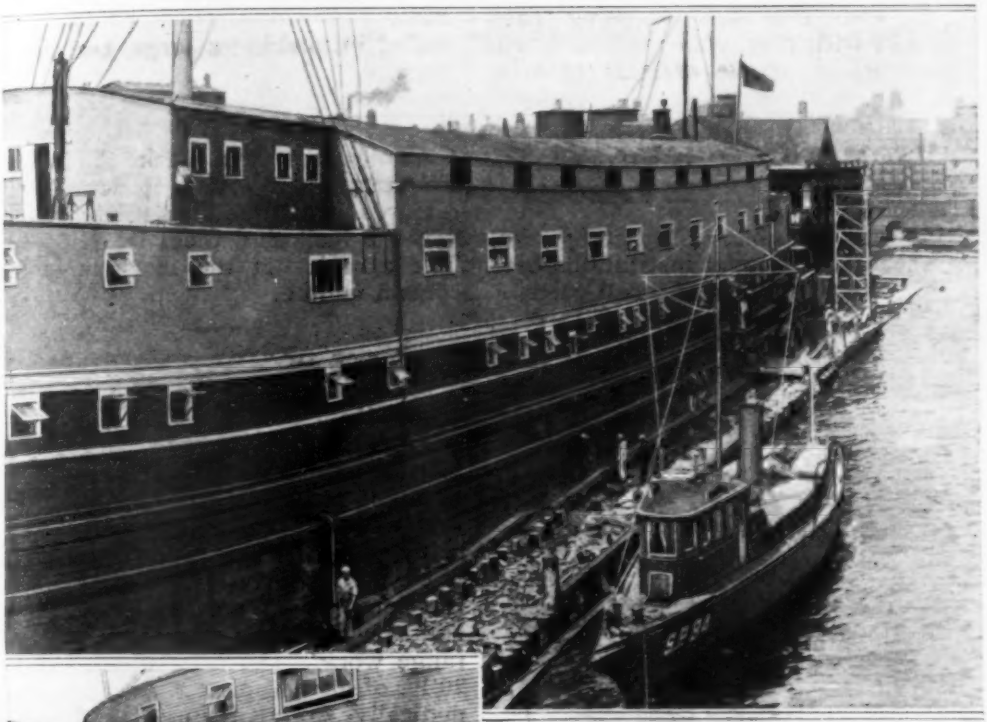
A pest of so-called May bugs in Switzerland in recent months has been turned to good account by the government, according to reports, and now these destructive insects are roasted in large quantities and stored for poultry feed.

CUT TAPE WITH BAND SAW FROM BOLT OF CLOTH

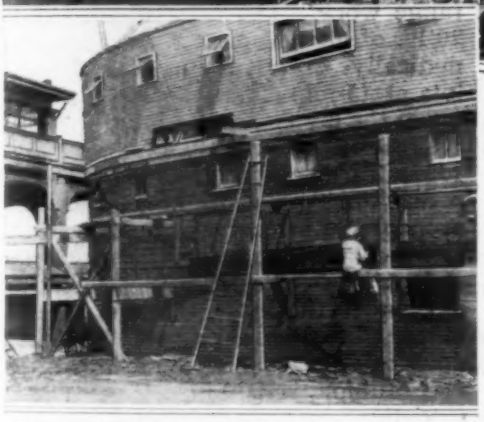
An electrical-repair shop, being temporarily unable to obtain cotton tape ranging from ½ to 2 in. in width, succeeded by ingenious means in making a very satisfactory substitute from a bolt of cloth purchased at a dry-goods store. The cloth was tightly rewound on a ½-in. dowel and the surface of the bolt carefully marked off according to the desired widths. With a band saw the bolt was then cut into sections, after which both sides of the rolls of tape so made were given a heavy coating of shellac to prevent the edges, which of course were not selvaged, from unraveling. Before the shellac was wholly dry, the alcohol was burned off, giving the tape a tough edge.

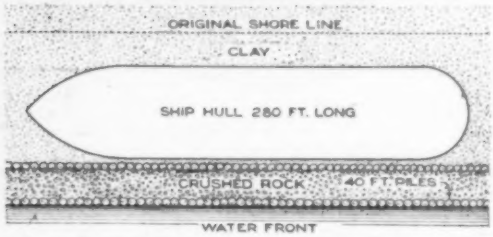
¶ Because nickel ore is not plentiful in this country, particular interest attaches to the announcement that it has recently been discovered in three places in Alaska.

RECEIVING SHIP OF NAVY NOW A LAND STRUCTURE



Above Is the "Commodore" Which Now Rests on Solid Ground on the Shore of a Down-Town Chicago Park. This View Shows the Lakeward Side of the Vessel, along Which was Placed a Bulkhead of Stone and Piles to Act as a Retaining Wall for a Filling of Clay Placed about the Boat





The Overhanging Stern of the Vessel, Indicated by the Dotted Line in the View at the Left, has been Boarded Up, Making a Large Storage Room under the End of the Hull. The Diagram Shows Where the Filling was Placed

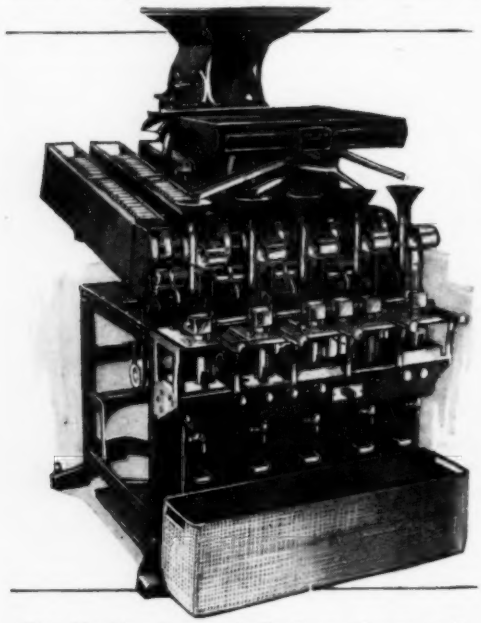
An interesting and unusual piece of engineering has changed a ship, which for years has been the floating home of sailors, into a land structure that will never ride the waves again. The vessel so transformed is the "Commodore," which lay at anchor in the Chicago River in days of peace, serving as headquarters for the Illinois Naval Militia. With the outbreak of the war the big wooden hull, long since deprived of its power plant, was towed into Lake Michigan and anchored on the shore of Grant Park, Chicago's down-town recreation ground, where it has since served as a receiving ship for the navy.

Since the vessel was never to be used for navigation again and was being badly racked by storms, it was recently decided to fill in around the hull with clay and rock. A bulkhead, made

of rock and 40-ft. piles, was built close to the boat on the lakeward side and at the ends, and the intervening space filled in with clay, well tamped down. The bottom of the craft is of 8-in. planking, and it is not expected that it will ever need repairing. The space under the projecting stern has been walled in, making a large, serviceable room.

AUTOMATIC COIN-HANDLING MACHINE SAVES LABOR

For banks, public-utility companies, and other commercial institutions that handle large volumes of small coins, a



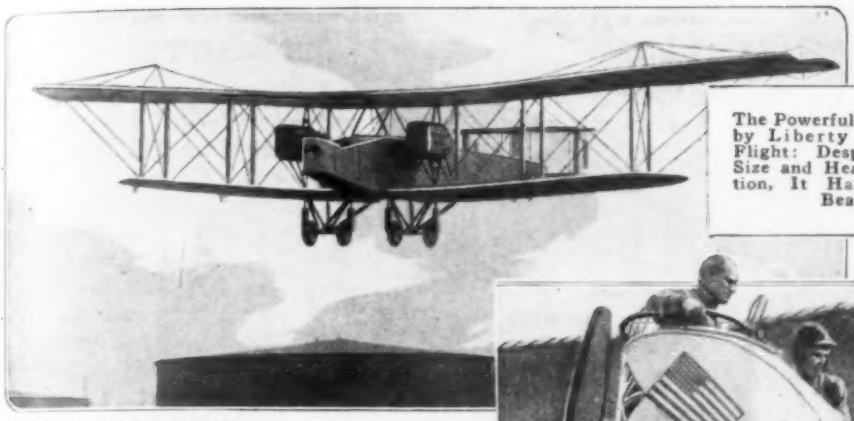
This Machine Automatically Sorts, Counts, and Wraps, or Sacks, 800 Coins a Minute

counting, sorting, sacking, and packaging machine is coming into use. It is supposed to do, with perfect accuracy and at high speed, the work that in some business houses demands the services of a corps of employes. The apparatus will accommodate coins of five denominations at one time. The money, consisting, for instance, of pennies, nickels, dimes, quarters, and half dollars, is fed into a hopper at the top. The mechanism, driven by an electric motor, sorts the coins, counts them and registers their sum in terms of dollars and cents, and wraps them in the customary paper rolls. Or, if desired, it will package those of certain denominations and sack the others simultaneously. Also, it detects and discards worn and mutilated coins without including them in the count. The capacity of the machine is 800 coins a minute.

ALLIES BOMBARD GERMANS WITH PROPAGANDA

Propaganda rifles are among the effective weapons that are being used by allied troops in quiet sectors along the western front. They are especially designed to hurl "grenades," filled with pamphlets and tracts, into the German trenches. Cloth and paper balloons are being employed for long-range work. The former carry about 20 lb. of printed matter which is automatically dropped in quarter-pound lots at 15-minute intervals. Points as far in the interior as Berlin and Vienna are reached. For distances up to about 100 miles, small paper balloons of four-pound lifting power are used. The propaganda offensives are launched in the mornings between three and five o'clock when the German soldiers are not under the close scrutiny of their officers. Such things as Prince Lichnowsky's disclosures, the letters of Dr. von Mühlon, reliable German casualty statistics, and descriptions of Germany's internal conditions, are spread. That much of the matter actually reaches the soldiers and is read has been proved. Prisoners often have sheets of it in their pockets.

¶The quantities of machinery which have lain idle in Alaska since the gold rush to that territory 20 years ago, are now being gathered up by enterprising junk men from Seattle and elsewhere, and are yielding them large returns.



The Powerful Craft, Driven by Liberty Motors, in Flight: Despite Its Great Size and Heavy Construction, It Has Grace and Beauty

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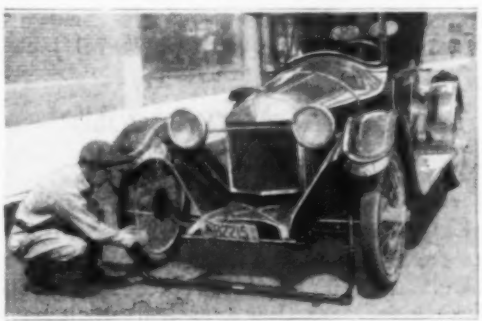
AMERICAN-BUILT HANDLEY PAGE BIPLANE SUCCESS

When the first American-built Handley Page aeroplane, the largest and most powerful of all successful biplanes, made its maiden flights in the East some weeks ago, it was driven by two Liberty motors. The performance of the machine delighted all the aeronautical authorities who witnessed the trials. Although of great weight and size, the machine responded splendidly to its controls and appeared in every way up to standard. Those who are familiar with America's aeronautical history will be pleased to note that this great Anglo-American craft has been christened the "Langley," in honor of the late Prof. Samuel P. Langley, formerly secretary of the Smithsonian Institution, whose experiments in aerodynamics did much to promote aerial navigation.

The Nose of the "Langley," the First American-Built Handley Page Biplane, on the Eventful Day of Its Christening and Trial Flights

WHEEL-ALINING TOOL SAVES TIRE BILLS FOR MOTORIST

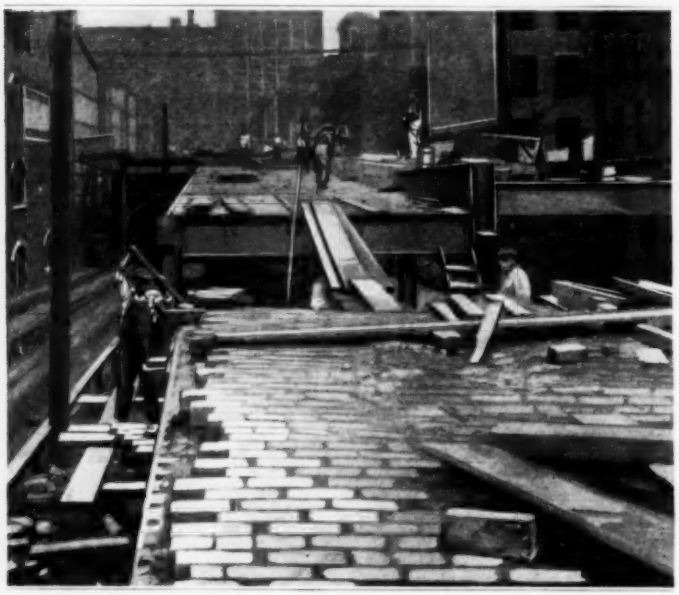
It is the sudden destruction of tires that usually informs a motorist that the wheels of his car have got out of alinement. This is a costly means of obtaining mechanical information. It will be of interest to many owners, therefore, to know that an alining instrument has been introduced that enables one to make accurate measurements and quickly determine whether or not there is misalinement. The device consists of a U-shaped tube with telescoping plungers at either end that mount a smooth and a graduated pointer. With the latter the exact distance between rims can be determined.



Making an Accurate Measurement of the Distance between the Fellies of the Front Wheels to Determine the Condition of Alinement

BIG STEEL BRIDGE RAISED TWELVE FEET

The raising of an 800-ton steel bridge was an engineering feat recently performed in Cincinnati in connection with the construction of the new Dixie terminal in that city. In order that Kentucky cars might have access to the terminal it was necessary to build an extension to the bridge over which the cars traveled. This improvement involved the changing of track levels, including the raising of the bridge a distance of 12 ft. with powerful jacks.



In the Foreground Is the End of an 800-Ton Steel Bridge in Cincinnati, Which is being Raised 12 Feet to the Level of the New Extension Shown Beyond

ICELAND TO BECOME SOVEREIGN STATE

According to an agreement, Iceland, which has been a possession of Denmark, becomes a sovereign state on December 1, of this year. The document declares that treaties which have been entered into by Denmark with other states hold good with respect to Iceland, but the new agreement granting sovereignty will stand only if approved by the Icelandic authorities.

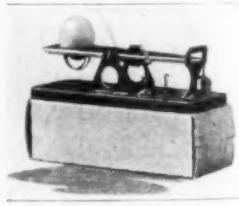
REBUILDING OF SALONIKI IS PLANNED

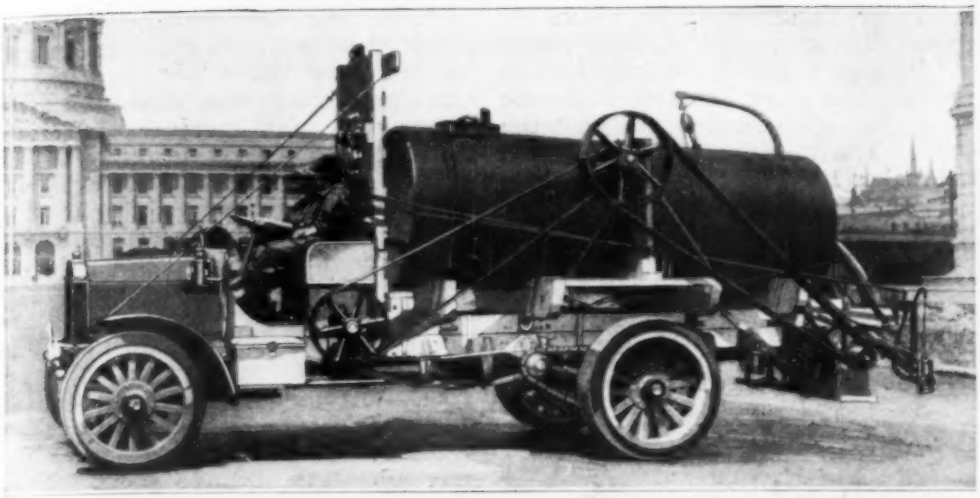
Preliminary steps have been taken by the authorities in Greece looking to the rebuilding of the vast fire-devastated area of Saloniki. French architects have drawn up plans and an exhibit has been held showing what is proposed, not only in the building line but in laying out new streets, providing sewer and water systems, and preserving the old Byzantine churches and other monuments. Before the fire this region was inhabited by 60,000 persons.

To carry out the comprehensive plans proposed it will be necessary for the government to acquire the entire burned tract and then resell it. A large amount of capital will be needed to carry on the building operations, and because of the difficulties of transportation and the scarcity of workmen and materials, the project may be postponed until after the war. No doubt foreign firms will aid in the rebuilding.

EGG SCALES AN ACCESSORY FOR POULTRYMEN

To help poultrymen catering to high-class trade, a small egg scale has been designed with which eggs can be sorted according to weight, thereby assuring the customer a product that comes up to a specified standard. The scale is of the balance type and various weights are provided for use with eggs





Truck Equipped for Many Kinds of Work on a Large Ranch: The Water Tank, Used in Road Sprinkling, Together with the Pump, can be Removed When Desired. Back of the Driver's Seat is Concealed a Telescoping Mast for Use in Loading Hay

of different breeds. In place of the pan there is a ring in which the egg is placed on end.

SAFETY RAZORS SUPPLIED TO MEN OVERSEAS

In conformity with the desire of those in command at the front, that every American soldier be clean-shaven, safety razors are being issued to the enlisted members of the army in oversea service. It is said this is the first time in the history of our fighting forces that this toilet article has been included among those supplied by the government. The quartermaster general's office is also prepared to furnish the men with additional blades as they are required.

FARM TRUCK EQUIPPED FOR MANY TASKS

An especially equipped motor truck, in use on a 1,000-acre bean ranch, is a veritable jack-of-all-trades so far as farm work is concerned. Mounted on it is a 1,200-gal. water tank for sprinkling roads, and connected with this reservoir is a pump, operated by power derived from the transmission, which can draw 300 gal. of water per minute from the irrigation ditches. The same power connection can be employed in operating any other piece of machinery. The tank and pump are mounted as one unit and can be removed to permit the use of a truck body for other hauling. Back of the driver's seat is a headboard, 7 ft. high, to which is attached a telescoping mast used in loading hay, and also serviceable in rescuing stock mired in ditches. Being provided with a towline, the truck can also handle one or more trailers.

SPECIAL SEWING MACHINE FOR MAKING BALLOONS

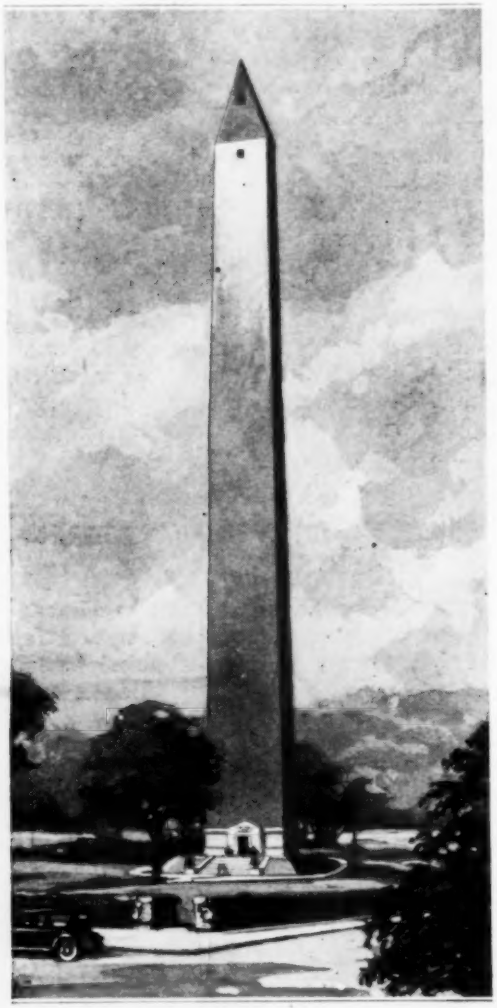
Decidedly unusual features characterize a sewing machine designed for sewing large pieces of fabric such as are used in making balloons and other bulky articles.

It makes two lines of lock stitching, ⅛ to 1 in. apart. The post from which are fed the two under threads is 7 in. high and its top measures only 1⅞ by 3½ in., while to the right of the post is a clear space of 11 in., affording ample

room for handling large pieces of goods. There are two separate presser feet, one to assist the drop feed in carrying the work forward, while the other rises and descends to hold the work. The machine is motor-driven and makes 1,800 stitches per minute.

MIGHTY OBELISK TO HONOR JEFFERSON DAVIS

A historical monument of peculiar interest to the southern states is a great obelisk of poured concrete which is being reared on the Christian-Todd county line in Kentucky, as a memorial to Jefferson Davis, the president of the Confederacy. The shaft, which was begun early in the summer of 1917, will be reared to its full height of 351 ft. sometime next summer, it is expected. It is the principal feature of a park that includes 19 acres of the farm on which the southern leader was born and lived the first three years of his life.



Shaft being Reared in Kentucky, near the Birthplace of Jefferson Davis: It will be 351 Feet High and will Cost about $150,000

The foundations of the obelisk are 20 ft. deep, extending down to solid limestone, and 43 ft. square at the surface. Within the base is a room, 18 ft. square, from which an elevator shaft leads to an observation room at the top. Portions of three states can be seen from this lofty point.

The monument will contain 6,000 cu. yd. of sand, a like amount of crushed stone, and 5,000 bbl. of cement, while its weight will be more than 13,000 tons. The cost, which is estimated at $150,000, has already been largely met by private contributions from men who were in the southern army, and others.

The stone used in construction is dug near by, crushed at the base of the monument, fed into a mixer, and then elevated to the top, where it is poured into steel forms. In this way 4-ft. courses are laid, each course requiring two or three days.

FIRE EXTINGUISHERS CONTAIN GASOLINE

An investigation into the cause of a fire in an eastern city and the reasons for its persistence revealed the fact that the fire extinguisher which a workman used in trying to extinguish the blaze was filled with gasoline. Further search showed that a number of extinguishers in the plant had been tampered with in the same manner. As a result of these discoveries and of attempts to destroy property made by enemies of the country, a warning has been issued against the evil practice cited above, and persons who have any cause for suspicion are urged to examine the extinguishers on their properties.

IT behooves us to be on our guard. Already German propaganda is busily at work in this country to establish a condition of mind on which it hopes eventually to realize in a weakened public sentiment. It emphasizes the spirit of forgiveness—let bygones be bygones—they see their mistake—the German people were not to blame, and so on.

Let the Punishment Fit the Crime

There is only one safe course for civilization, unless it seeks a repetition of the present conflagration. The offender at the court of nations must not only be punished, but must be rendered harmless.

In the case of an insane, or malicious, bad man loaded with dangerous weapons, who is apprehended killing enemy and innocent alike, he is first of all deprived of his weapons, and then locked up and carefully watched until reason is restored.

The Hun is the Bad Man of the World. As the first condition to peace, there should be taken from Germany all her dangerous weapons of warfare. All battleships, submarines, and ships of war. All weapons and remaining ammunition of her armies. All machinery used in the construction and manufacture of same. All records of the military system with which her secret-service archives are filled by the ton. As a partial offset to the industries and cathedrals and towns wantonly destroyed in Belgium and France, burn or destroy all her plants for the making of utensils of war and all shipyards where warships are built. Remove all submarines and air craft, and destroy the places where these have been or can be kept. Carry away all materials gathered for the manufacture of things of war. Root and branch, let the work be thorough and unwearied. Forbid her to maintain either navy or army for a long term of years. Let the leaders who represent the spirit of Hunism suffer the just penalty of their crimes, by permanent exile, or otherwise, as necessity may decree.

With these things accomplished there may be hope, in the course of two generations, that the German people may come to realize what constitutes the qualifications for membership in the family of nations.

When the poison gas of German propaganda reaches us, as it inevitably will one of these days, and your generous sympathies are appealed to, "to forgive and forget," do not forget the enormity of the offense; how totally uncalled for was its occasion; and the spirit of greed and power which prompted it all; and like a juror sworn to put away his sentiment of pity, and render only justice according to the law, so let us each stand firm and lend our voice to a public sentiment which demands punishment for the offender, and protection to the world.

FOR every day the war is prolonged some advantage is lost to Germany when the time arrives to write the terms of settlement. Not long ago a large portion of our people were rather indifferent to what those terms might be so long as the sacrifice of life, the devastation of property, and the unsettled condition of the world at large were brought to an end. This feeling was not due so much to a careless indifference of what the struggle for world freedom had cost those countries who are now our allies, as it was to a lack of appreciation of what they had suffered and a proper realization of the enormity of the offense against civilization. Busy as usual, even more so, in our accustomed occupations, we did not take the time we should, to think the matter out, each for himself.

Immature Peace a Colossal Calamity

We read with horror and repugnance of one event after another in which acts of torture and barbarism had been resorted to by the enemy, but absorbed in our own personal ambitions we failed to comprehend that these offenses were in reality as much directed against each one of us individually as they were against the immediate and direct victims of those efforts. Nor was it through any intentional disregard of the great wrong being enacted, that we listened to the clang of bells and scream of sirens as the fire department dashed past our offices and homes to battle with the conflagration in a distant part of the city—so distant we could see neither the smoke nor flame; and a moment later, when the alarms had died away, the most of us resumed our occupations and dismissed the matter

from our minds. A few drops of rain had fallen, but the lightning had not struck. That we might be morally wrong in doing so did not occur to many; probably it is human nature the world over to be sentimentally sorry, but not to the point of sharing another's burden.

And this was our national attitude of mind four years ago today.

Steadily, but with progress so insidious and slow as to be at times unnoticed, the storm approached our own shores and homes, until it reached our very doors. Now that an unscrupulous enemy lies in wait to sink hospital ships bearing our own nurses and wounded; drops bombs on our own hospitals behind the lines, and in its effort to subjugate the nations of the world is responsible for the casualty lists that face us daily, do we slowly begin to absorb and comprehend that feeling of indignation and hate which permeates to the remotest corner of the lands of our allies. We at last begin slowly to realize the Colossal Calamity of an Immature Peace. Until the cancer has been cut out to its last fiber, until the Thing has been utterly crushed, it were vain to even think of peace.

We may well ponder on these recent words of Lloyd George:

"We have suffered in the war, perhaps through lack of preparation before we entered it. Do not let us make the same mistakes in peace, through entering on a peace without preparation. It would be even more disastrous than the mistakes you might make by entering into war without preparation. Whatever you do, must be just to everybody. The world has got to be everybody's world. It is not going to be the world of any one class. Out of this agony of the world, let us see that no deformity is born, no militarism, no mammonism, nor anarchy either. The liberty of the world has been fought for by men of all ranks. They have come from the palace and mansion. They have come from humble cottages. All classes and ranks, all stations of life have contributed to the making of a new world. Let them each and all have a fair share in it."

For the present, then, civilization has but one effort, one purpose, and that is to win the war, but when the day comes in which to consider the terms of peace, may we think with deliberation and soberness, and not forget its awful cost, and the necessity and responsibility of a right and lasting settlement.

When the Transatlantic Flight?

IN a recent issue of "Flying," a monthly devoted to that subject, and apparently the organ of the Aero Club of America, and its thirty affiliated American clubs, there appeared what purported to be an account of the first transatlantic flight. This flight was stated to have been from Newfoundland to Ireland, without stop, and to have been made on July 28-29, the voyage requiring but 24 hours 10 minutes. A two-page marine chart showed the intended and actual lines of flight, and the navigator's log gave exact altitude, and latitude and longitude obtained by observations. Three destroyers were said to have been placed at suitable intervals along the proposed course to render assistance if required. There was nothing in the article to suggest it was not a true account of an actual record-breaking accomplishment of incomparable world interest.

It is supremely disappointing to learn that the article turns out to be one purely theoretical, and that a publication which has been considered authoritative, if not official, of the aero clubs, should lend itself to a canard. Mr. Henry Woodhouse, chairman of the publicity committee of the Aero Club, however, informs us the "article was written to show that all the problems of flying across the Atlantic have been solved, and to ascertain by submitting the subject to the public whether critics could find anything impossible regarding the plan. The flight has not actually been made, but could be made, and may be done before long."

It is therefore, unfortunate, to put it mildly, that after all the delays in plane construction, and all the exaggerated hopes held out in daily papers last year, to add one more. We all recall the thrill of satisfaction when Blériot made the first flight across the English Channel; to cross an ocean is an incomparably greater undertaking.

When the war began, in 1914, comparatively few on this side realized the tremendous importance the air service was to assume. The public, certainly, thought of war planes in terms of hot-air balloons and trapeze performers at county fairs. So important has the flying arm become, however, that, doubtless, could we put in service at the front tomorrow 25,000, or even 10,000, bombing

planes, the war could be shortened from years to months, if not indeed from months to days. It is useless to chafe at the thought of more than 12,000 graduated fliers at this moment anxiously waiting for their machines. However, yesterday the glad news came from General Pershing that the first American planes, with Liberty motors, had safely returned from their first flight over the enemy's lines, and from now on we may look for a reasonable increase in our flying corps.

It is probably not too much to expect that before many months, we will be shipping our planes to France through the air, instead of on ships, which would put them over there, with one or two landings, in, say, two to three days as against an average of 10 or 12 days. Surely, if any nation can do it, we can; but there are conditions which arise in connection with a long flight which are out of proportion to those of short flights; somewhat as one who can eat a dinner in one hour would find it difficult to eat ten dinners in ten consecutive hours. However, the best minds and spirits in aviation, here and with our allies, are working night and day to accomplish this great feat, and some morning we will wake up to find it has been actually done. Let us hope the honor may be ours.

Unnecessary Travel Unpatriotic

THE American people are rapidly becoming as patriotic in action as they really are at heart, and as it takes time to drill holes in a rock before the blast can be fired, so a certain element of time is inevitable in getting down to all the individual necessities of each one doing his utmost to help win the war. And our spirit of patriotism is rapidly rising to fever heat. From Eastport, Maine, to Seattle, Washington, millions are knitting, preparing Red Cross supplies, and selling the various war-fund securities. Millions more are furnishing the funds for these efforts, and are pouring their money into the national treasury. It is a new, or rather awakened, spirit, because the occasion for it did not exist for over half a century. So let us all get into the work, not as a matter of duty, but as something we are as anxious to do, as the boys are anxious to get "over there."

It has not occurred to many of us that to refrain from unnecessary railroad travel made any particular difference. But it does, and Director-General of Railroads McAdoo has issued a statement to the public asking for the largest possible curtailment in passenger travel. The fewer passenger trains, the more engines and crews to handle freight; the fewer sleepers and passenger coaches, the more coal can be saved. The movement of troops and war supplies is seldom seen by many people, hence they fail to realize the tremendous volume of war traffic which did not exist a year ago. Even several months ago the freight traffic due to hauling war stuff amounted to an increase of 10 cars per minute, and must be much greater now.

There will doubtless be sufficient cars for the actual necessities of travel, but a big saving can be accomplished if every one will help, and the money saved can be put into the purchase of Liberty bonds and thrift stamps.

Purge Our Population

LAST month we considered the advantage of sending back bodily to Germany those willful spirits whose actions and utterances were so flagrant our government has been forced to intern them for the duration of the war. It might be added that failing to do so, and turning them loose again in our midst, they, impenitent, will still cherish those same un-American ambitions, with a resentment added by reason of their imprisonment.

But why should we single out or restrict ourselves to these few hundreds who have been found guilty in our courts of justice? For each one so convicted there are a thousand whose hearts are bitter against American principles and ideas of freedom and individual privilege. The very fact that any man or woman could live, say even five years, in this country and still be loyal to the kaiser and disloyal to the United States, is sufficient evidence that he lacks the materials which come out gold from the melting pot. He is dross, the pure gold is not in him; nor is it likely the alchemy of freedom, even such as ours, can ever make him over. And if after a few years of opportunity he has failed to respond, then it is evident

he is a menace, and not worth, nor deserving, any further effort. He is a clog and drag on our civic progress, even though he may do an honest day's work and keep out of jail.

Now is our opportunity to emphasize what American citizenship means, and to declare unmistakably that any who do not and will not become one of us in our ideals of national citizenship, and share conscientiously our ideals and our freedom, is a misfit and does not belong here. Such men and women are a menace as long as they remain. Their absence, therefore, not their company, becomes desirable.

The founders of this country never intended it as a home for aliens; it was to be the home of Americans, whatever their nationality of birth. It was never intended as a sanctuary for those who wished to escape the severity of other governments without accepting the easy obligations of ours. It was not simply to provide a place where jobs could be had at better wages than at some foreign home, that the Declaration of Independence was fought for and signed. America was conceived for Americans, in the full and right sense of the word, and not for dissenters and traitors. It was not opened to Germans that they might come over here and be Huns, either in word, spirit, or deed.

And yet they are here, by thousands, and we permit them to remain. How long do you think a patriotic American in Germany would be allowed to denounce Germany and ascribe all the virtues to America? He would not be shipped, he would be shot, and that before sundown. We need not stoop to the cruelty of Huns, nor would we ever do the atrocious and uncivilized things they have done and are doing. We never would, or could. But why should we tolerate, a day longer than the ships can be built in which to deport them, the presence here of those who, by their own emphatic utterances, are not now and want never to be, one of us?

The transition from imperialism to democracy has been so extreme, these people have despised us and our government. They have translated liberty into license and scorned us for our generosity.

It would not require so very many of the 6,000 ships now building, and to be built in the next 30 months, to bring a great light to some people. Many would then awaken from their sleep of Hunnish centuries, and begin to grasp the immeasurable benefaction of being permitted to live here. And as for the others, they are irredeemable and hopeless, and the sooner we rid ourselves of them, the better.

When one thinks of the hundreds of thousands of loyal Americans, as loyal as you or I or anyone, who, born in Germany or of German descent, are gladly sending their sons to fight the battle for freedom, and with voice and purse doing their utmost, one regrets to have to raise pen, or act, against some of their race. But no one more than the loyal American of German blood will approve a thorough purging, not only of disloyal Germans, but disloyal anybody, regardless of their nationality!

Send them all away, no matter who or what they are, if they are anything but Simon-pure Americans now. And having sent them away, make it impossible for them, or their children, ever to enter our gates again.

Aug. 17. H. H. WINDSOR

USE AIR-CUSHION GLOVES FOR BOXING INSTRUCTION

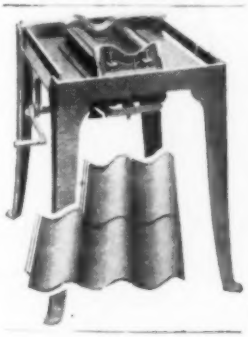
Because of the unqualified indorsement given by well-known physical directors and champion pugilists, sparring devotees will be interested in knowing of a pneumatic boxing glove that has been pronounced ideal for practice and training purposes. A reinforced, air-filled rubber bladder of ribbed construction takes the place of the hair padding usually employed. Only the wrist and thumb are stuffed. The glove is light, shapely, and durable, and enables boxers to use their full striking powers without injuring each other. With gloves of this type, beginners are less hesitant in taking fistic training than is usually the case, it has been found at army camps.

NEW TREATMENT TREBLES HARDNESS OF LEATHER

The claim made by a Norwegian engineer that he has discovered a process by which leather can be made two or three times as hard as it is normally, is of very special interest in these days of high prices for footwear and other leather goods. While the leather can be made as hard as wood, it does not lose its elasticity, it is said, and also acquires greater resistance to both heat and moisture. The inventor, who proposes to place his product on the market in Norway, asserts that leather commonly fit only for insoles can be made durable enough for outer soles by this new process.

CONCRETE-TILE MACHINE HAS NEW FEATURES

A hand-operated machine has been placed on the market for making concrete tiles of the Spanish mission type. It fashions a transverse flange for interlocking on the upper end of the tile, corresponding to the groove on the underside of the lower end, this interlock being formed in such a way that the tile can be adjusted up and down without danger of permitting rain or snow to be blown in. No matter what the length of the rafters, cutting of the tile is no longer necessary, except for valleys, hips, etc. Holes are provided for fastening the tile with wire or nails. With a little experience a man can make 60 to 70 tiles an hour.



DISPLAY ADVERTISES TOWN AND ITS COMMODITY

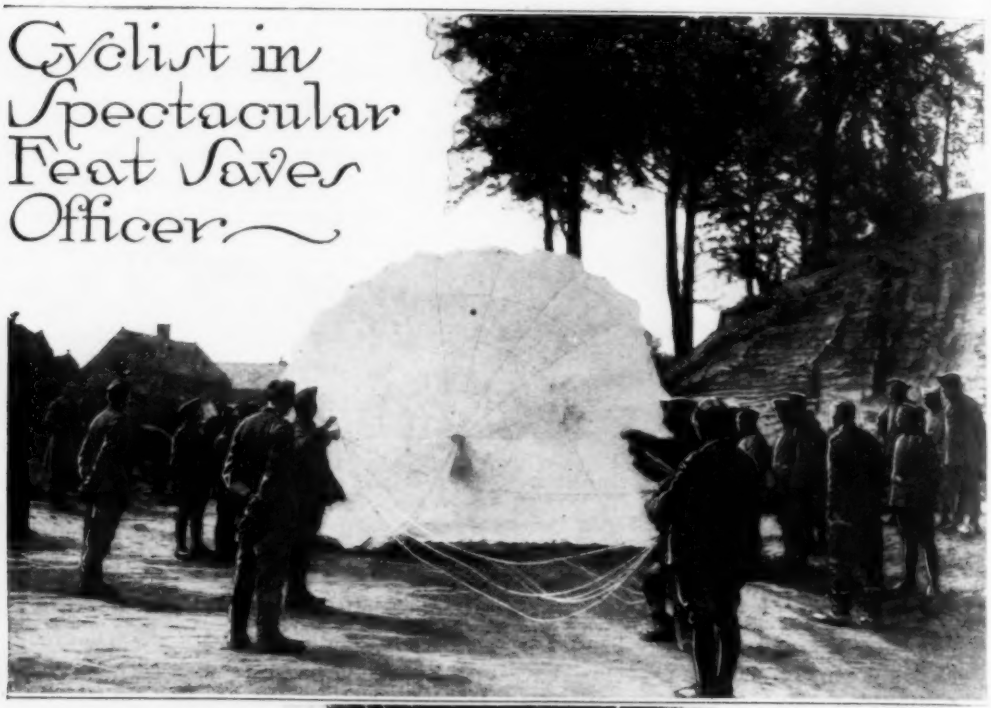
A piece of civic advertising which makes the town remembered by practically every person passing through it, consists of a corn display that stands on the station grounds at Ipswich, S. D. A rectangular building has been completely covered with ears of field corn, arranged according to colors, to spell out the legend, "Ipswich, S. D., Edmunds County." When transcontinental trains pass through the town at night the display is lighted by lamps partly concealed near the top. The sign is doubly effective because it links the name of the town with an important product of the region.

Striking Display on the Station Grounds of Ipswich, South Dakota, Which Leaves No Question in the Minds of Strangers as to the Name of the Town or What Product is Grown in the Region

GIVES MILLIONS IN HONOR OF SHARERS IN THE WAR

A gift of $2,500,000 has just been made to the University of Chicago, by LaVerne W. Noyes, of that city. The fund is to be used in paying the tuition of men and women who have shared in the present war—or their blood descendants—who are deserving of assistance in obtaining an education. In addition to the tuition to be paid, 20 per cent of the income is to be used in paying the salaries of persons on the university staff engaged in teaching American history, or the public duties of citizenship, including political economy, political science, and sociology.

Cyclist in Spectacular Feat Saves Officer



Preparing to Pack an Observer's Parachute, a Task That must be Done with the Utmost Care

In Each Container Hanging from the Basket Is a Parachute So Folded That It will Open Instantly When Withdrawn

At the risk of his life, an army motorcyclist at one of the training camps recently averted the death of a young lieutenant by a most extraordinary feat of heroism. Racing at high speed across rough ground, he drove his machine into a runaway parachute that was dragging the officer to his death. The latter had made a practice parachute jump of 2,000 ft. from an observation balloon. A high wind had carried him a considerable distance, and in landing he became hopelessly entangled in the cordage. The parachute was caught by a strong air current and blown at terrific speed across the field, pulling its helpless prisoner with it. At the same instant the cyclist, passing along a near-by motor road, saw the officer's plight. He swerved his machine into the field, and raced at top speed squarely into the middle of the bellied parachute. The motorcycle and its rider were hurled violently to the ground. The ropes fouled the machine and the weight of the latter anchored the derelict against further movement.

The rider suffered a fracture of the left arm, and was severely blistered, for the fuel tank of the motorcycle burst and he was sprayed with gasoline. The lieutenant, unconscious and badly bruised, was freed from the cordage and taken to a field hospital, where he was revived.

The incident is an excellent demonstration of two sterling qualities pos-

sessed by the American soldier. One, the result of our system of training, is mental alertness. The other is plain unadulterated Yankee nerve.

WIRELESS AND BATHTUBS IN ALASKA SCHOOLS

Perhaps in no other schools in the world are there to be found such contrasts between the primitive and the very modern as exist in many government schools for natives in Alaska. At several of these educational centers, the wireless plays an important part not only in keeping the community in touch with the outside world, but also in their instruction. The morning program is frequently occupied with reporting the latest world events to the pupils, and also their parents who crowd into the building eager to be informed. To properly grasp the trend of affairs, they have to learn not only the language used in the school, but geography and something of history and government.

In one institution, on the shore of the Arctic Ocean, a bathroom is a novelty and convenience used each Friday by the girls and each Saturday by the boys. Before the founding of the school, bathing in water was practically unknown. A few of the adults are allowed to bathe in the school tub, but the number has to be

Observer Descending from a Lofty Observation Balloon in a Parachute, a Hazardous Feat to Which the "Eyes of the Army" Must Often Resort to Escape Enemy Fire

A High Wind Caught Observer and Parachute and Swept Them across the Field, when a Passing Motorcyclist, Disregarding His Own Safety, Drove Swiftly into the Canvas Stopping It and Saving the Balloonist's Life

limited on account of the scarcity of water.

On Monday the melting of snow begins, to accumulate enough water for the week-end ablutions, and since fuel is precious too much cannot be used for thawing. Many of the teachers have rendered heroic service in caring for the sick and injured among the natives, sometimes traveling hundreds of miles on these errands of mercy.

TEXTILE MACHINES CLEANED BY VACUUM APPARATUS

Many interesting and important uses aside from the commonplace ones have

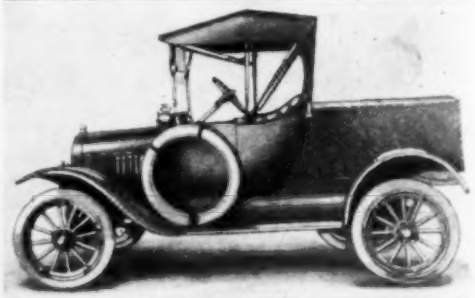
Using a Special Vacuum Cleaner for Removing Dust and Lint from Spinning Machines

been found for vacuum cleaners. Various types of special apparatus have been developed for simplifying tasks that have heretofore been more or less difficult and time and labor consuming. Under this classification comes a compact portable outfit that is particularly intended for use in the textile industry. It is used in collecting the lint and dust that accumulates around the "million spindles" and other parts of the great spinning machines. By the vacuum process, work of this sort is done quickly and efficiently, and with little danger of breaking the innumerable threads that form gigantic webs in front of the working parts of the complex machines.

RURAL DENTAL CLINICS WORK GREAT BENEFIT

Appalling conditions have been revealed in Vermont among the country-school children as a result of recently inaugurated rural dental clinics throughout the state. Physical examinations show that 95 to 98 per cent of the children in rural schools are dental cripples, the children averaging six to eight cavities each in addition to two or more broken-down abscessed teeth. Less than five per cent of these, reports show, have ever received dental treatment.

Through the generosity of private individuals a fund has been established enabling a dentist to travel through the rural districts with an automobile equipped with a portable army dental unit. The clinics are organized with the coöperation of the state boards of health and education. The plan is to reach all children, from 6 to 12 years, in need of treatment. In addition to treating them, lectures are given on the care of teeth and they are provided with toothbrushes and powder, all free of charge. It has been definitely proved that correction of the diseased condition of the teeth and teaching a child the proper use of a toothbrush will increase his efficiency in school work from 40 to 90 per cent.



Automobile Which Carries a Portable Dental Outfit Weighing 400 Pounds, Used by a Dentist Who Holds Clinics in Rural Districts in Vermont

TOP-HEAVY SIGN SUPPORTED ON CANTILEVER BASE

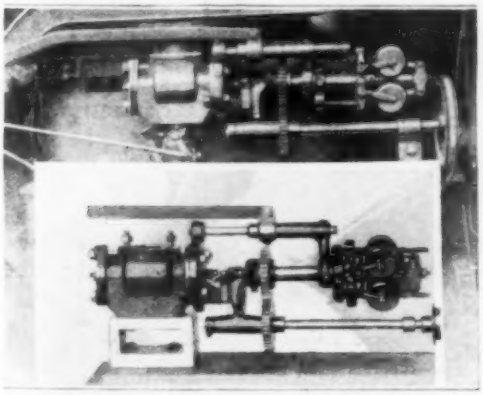
Quite an interesting engineering problem was encountered recently in erecting a large illuminated clock and four-sided electric sign on the roof of a newspaper building in one of the western cities. Because of its design, with practically all of the weight and wind-sustaining surface at the top, the work of anchoring the structure safely was not an especially simple task. It was accomplished, however, by constructing a cantilever base on which the supporting framework was mounted. This arrangement caused the load to be imposed on the walls of the building.

The clockfaces are about 18 ft. across and the letters in the signs are nearly that long.

As an Index to the Size of the Clock and Sign, the Large Hands of the Former Measure Nine Feet Two Inches in Length

TRACTOR GOVERNOR HAS ADJUSTABLE FEATURE

A recently designed speed governor for gasoline tractors can be adjusted within a wide range of speeds from the operator's seat while the engine is running. It is provided with a piston valve which is installed between the carburetor and the manifold so that it automatically throttles the mixture. The set of weights, which through the operation of centrifugal force actuate the valve, are held in check by two straight five-leaf springs attached at one end to a movable collar. When the springs are placed so that only their thin ends press against the weights their resistance is slight and consequently the speed is slow, while for high speed the collar is moved closer to the governor, bringing the stiff base of the springs in contact with the weights and preventing their spreading apart.



In the Larger View a New Type of Speed Governor for Gasoline Tractors is Shown Adjusted for Slow Speed, While in the Insert It is Set for High Speed

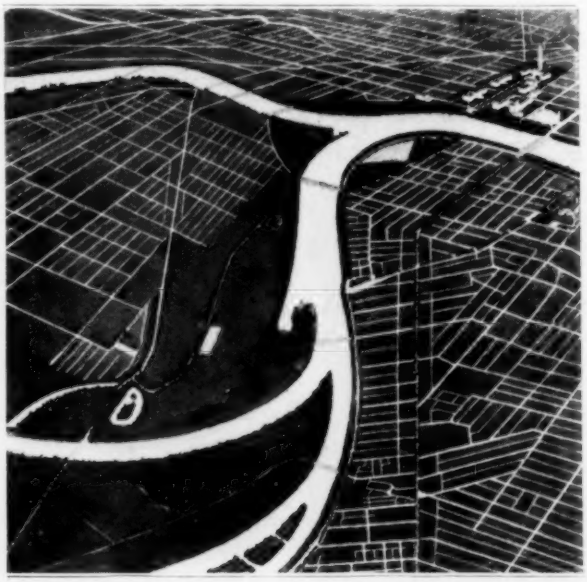
¶A boxing school, recently opened for officers and enlisted men in Madison, Wis., has nothing to do with the art of self-defense, the students there being taught by experts how to make crates and boxes that will occupy a minimum space in ocean vessels and withstand rough handling.

DAYTON PLANS IMPOSING CIVIC CENTER

The Façade of the Art Museum, Which Is One of the Five Principal Buildings Provided For in the Recently Completed Plans for Dayton's Civic Center: Those in Charge of the Work Devoted Months of Study and Investigation to the Problem before Recommending the Comprehensive Improvements Now Proposed

ONE of the most imposing plans for a civic center which has been proposed for any American municipality, is that contained in the recently completed report of the city-planning board of Dayton, Ohio. So comprehensive is the project that it may be 25 years before all contemplated improvements are completed. The plan fits in well with several buildings already located near the site chosen.

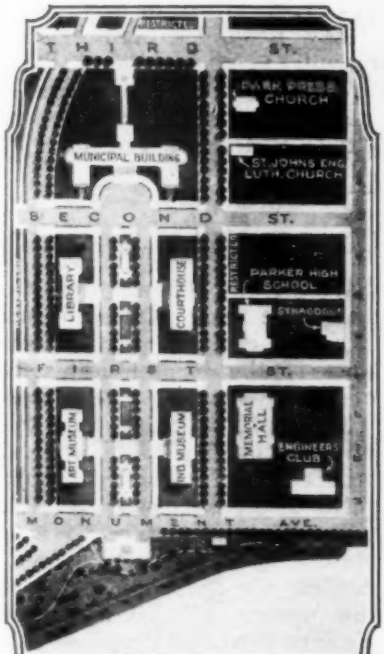
The central landscape feature of the scheme is a great rectangular parkway with a double thoroughfare running down its center toward the Miami River. At the end of the vista formed in this way, and not far from the river, will be the municipal building, the largest of five public edifices facing the open area, all of which are to be of white marble. It will be four stories high, with an 18-story tower at its center, near the top of which will be a large clock.



A General Plan Showing a Portion of the City of Dayton in Perspective, as It will Appear if the Proposed Improvements, Including Changes in the River's Course, are Made: The Civic Center is Located in the Upper Right-Hand Corner

At one side of the open area, next to the municipal building, will be the courthouse, containing all public records, etc., and the second largest structure in the civic group. Directly opposite will be the library, while next to the latter will be an art museum, a distinguishing feature of which will be six massive columns at the entrance. Across the area, facing the art museum, will be an industrial museum, where will be housed exhibits testifying to Dayton's pioneer work and progress in aeroplane building, cash-register manufacturing, the manufacture of automobile starters, and the like.

General View of Dayton's Proposed Civic Center Looking Toward the Municipal Building: Of the Four Other Principal Structures Special Interest, for Many, Centers in the Industrial Museum in the Foreground, on the Right, for Housing Important Industrial and Commercial Exhibits



Ground Plan of the Proposed Civic Center: It is Estimated That 25 Years will be Required to Complete the Improvement, Which has been Laid Out with a View to Harmonizing with Several Important Public Edifices Now Standing in the Vicinity

This Impressive View Gives an Idea of the Panorama That will Stretch before an Observer in the Top of the Municipal Building Tower. The Structures will Be of White Marble and, Particularly from Above, will Contrast Strikingly with the Green Lawns

It is also proposed to change the course of the river to suit the needs of the new arrangement, this alteration to be made a part of the big engineering work now in progress to prevent the recurrence of destructive floods by enlarging the channel.

WAR BRIDE'S SERVICE FLAG IS NEWEST EMBLEM

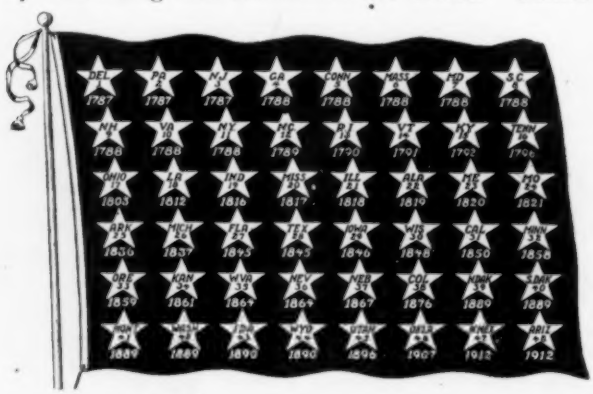
The newest style of service emblem is the war bride's service flag, which is being displayed by recently married women in the East whose husbands have entered the service. The field of this banner is divided diagonally into a red half and a blue half, while in the center is a white star surrounded by a white circle. It is designed to be hung under the regular service flag, displayed in honor of the husband, and only at the bride's home.

ADRIFT NINETY DAYS IN OPEN BOAT

How they drifted for 90 days in the South Pacific in an open boat, suffering almost incredible privation, has been narrated by two natives of the South Sea Islands, one of whom lives in the Gilbert Islands and the other in the Ellice Islands. According to their own account, the men tied their little craft to a pier while waiting for a steam launch to take them back to their ship, but before the launch arrived they both fell asleep. When they awoke the following morning they found they had drifted far out to sea. Three oars, a bucket, a flare lamp, tobacco, a pipe, and a knife constituted the sum of their supplies. A little rain water was caught from time to time and, at what seemed interminable intervals, they succeeded in catching small sea gulls. These they divided and ate. Once they snared a shark but were unable to eat the pieces they cut from it, even after drying them. Finally they grounded and crawled ashore on what proved to be one of the Mortlock Islands, in the Caroline group, some 1,300 miles from where they started three months before.

HISTORY OF AMERICAN FLAG TOLD BY NEW BANNER

Old Glory's history is concisely told by a new flag that resembles the Union Jack. Each of the 48 stars of this banner bears the name of a state, and beneath each is printed the date of the formal admission of that state into the Union. The first 13 stars are numbered and arranged in the order in which their respective states ratified the Federal constitution. Thus Delaware, the first state to take such action, is accorded the place of honor in the upper left-hand corner. Next to it comes Pennsylvania, and following it, New Jersey. Beginning with the fourteenth, the stars are arranged in the order the states were admitted into the Union.



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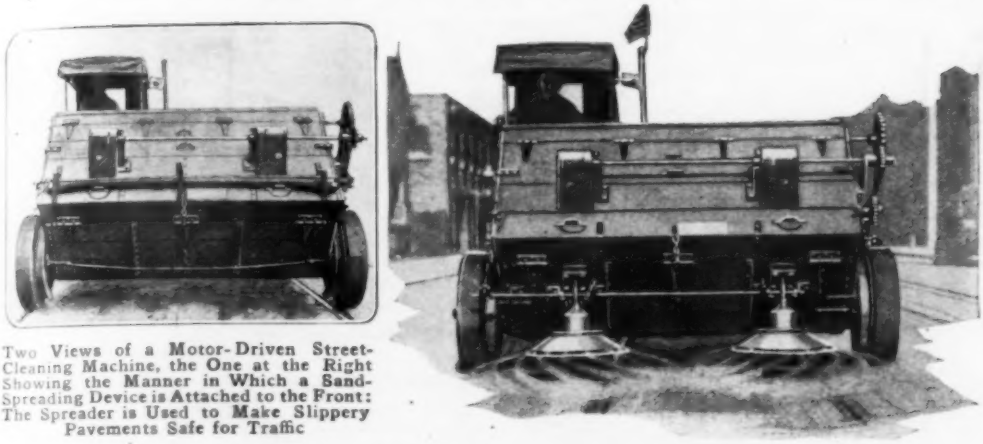
The Stars are Numbered and Arranged in Accordance with the Order in Which the Respective States Adopted the Federal Constitution



Two Views of a Motor-Driven Street-Cleaning Machine, the One at the Right Showing the Manner in Which a Sand-Spreading Device is Attached to the Front: The Spreader is Used to Make Slippery Pavements Safe for Traffic

SAND-SPREADING DEVICE FOR STREET CLEANERS

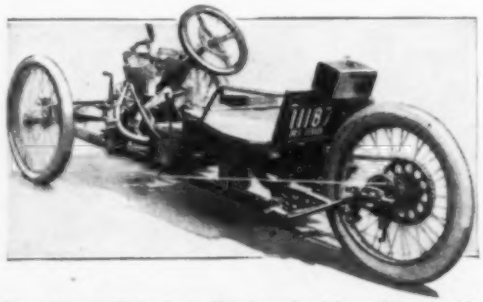
An attachment has been devised for motor-driven street-sweeping machines with which clean, coarse sand is spread over moist or icy pavements to make them safe for traffic. The sand is fed in any quantity desired from a bin in the sweeper to two rapidly revolving discharging devices, attached to the front of the machine. They are provided with circular covers so placed as to leave a narrow slot at their bases, through which the sand is thrown by centrifugal force and is spread evenly over a wide area.

METHODS OF TESTING COAL TO PREVENT COMBUSTION

To prevent large reserve piles of coal from taking fire through spontaneous combustion it is necessary to take a few simple precautions. Careful watch of the piles should be kept, and if steam is seen rising from them, an investigation should be made without delay. Another significant sign is an odor like that of burning sulphur or burning soft coal. To find out the heat condition down in the pile, an iron rod can be inserted, and if, on withdrawal, it feels hot, the temperature of the coal should be definitely ascertained. This may be done by inserting a thermometer into a pipe driven into the pile. Most authorities agree that if the temperature does not rise above 180° the fuel will not be harmed, but it usually is best to prepare to move the coal when it reaches 150°, and if the mercury mounts to 175°, leave the pile undisturbed no longer.

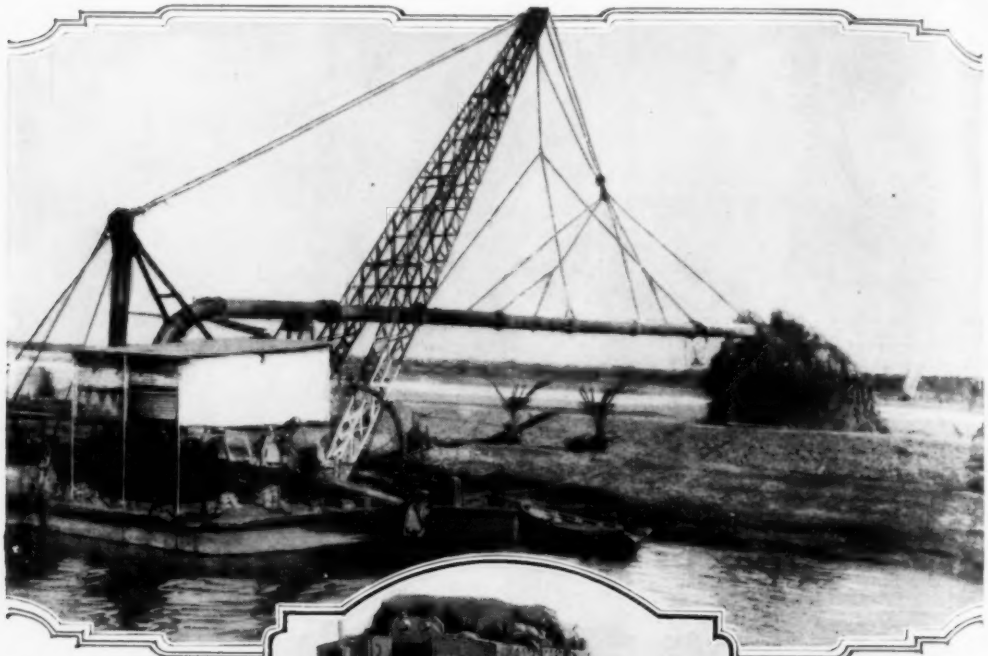
VEHICLE UNITES FEATURES OF AUTO AND MOTORCYCLE

A three-wheel vehicle which is giving good service is a novel combination of motorcycle and automobile parts. It is equipped with a two-cylinder motorcycle engine, mounted in front of the seat, and the power is transmitted to the rear wheel through a shaft, friction gear, and driving chain. The steering apparatus, clutches, and brake resemble those of an automobile. While the car is running at full speed a shift can be made direct to low speed, neutral, or reverse, if desired.



This Novel Vehicle is Equipped with a Motorcycle Engine and Wheels, but is Steered and, in a Measure, Controlled Like an Automobile

OUTFITS USED BY FIGHTERS IN VARIED TASKS



BRITISH OFFICIAL PHOTO

British Forces Dredging Swamp Land in Far-Away Mesopotamia with Modern Machinery: The Occupation of This Region by the Tommies has been More Than a Military Operation, for the Coming of the Soldiers has been Followed by Many Public Improvements of Lasting Value

Saving Precious Moments in Moving a Creeper-Tread Armored Car: When Forces are being Advanced to New Positions No Time can be Lost in Bringing Up These "Land Dreadnaughts" and So They are Often Loaded onto Swifter Motor Trucks, as Shown at the Left, Their Own Power being Used to Get Them Up the Inclines

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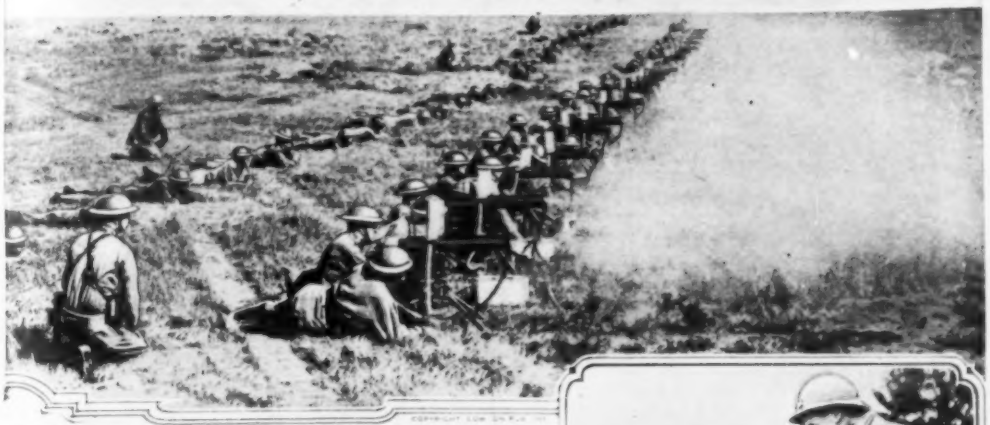
This Trailer Is Now a Part of the French Artillery Equipment Used in the Rapid Transportation of "75's". No Doubt Vehicles Like This Were an Important Factor in the Hot Pursuits Recently So Disastrous to the Huns

THESE SPEAK A LANGUAGE THE HUNS UNDERSTAND



In Recent Weeks the Machine Gunners, Including Many from America, have Done Some of the Most Effective Fighting. The Above Photograph, Taken at a Training Camp, Shows Men "over Here" Receiving the Same Sort of Training with Browning Automatics That is Making Their Comrades Invincible "over There"

Six or Eight Men are Required to Carry This Novel French "37"—a Gun to be Dreaded Infinitely More Than the Old Blunderbusses That Its Wide-Spreading Muzzle Suggests. It Is a Quick-Firing Gun Which Attacking Infantry Carry with Them

With These Small Trench Mortars Compressed Air is Used to Discharge the Shells, and That Accounts for the "Bicycle Pumps" Which Two of the Men are Holding

Though Its Carriage Looks as If It had been Appropriated from Some Piece of Farm Machinery, the Germans Possess a Profound Respect for This French "155" Mortar, Which is Used Everywhere in Following Up and Supporting the Infantry

IMPRISONED ALLIES IN IMPRISONED GERMANY

German Evidence of How Effectively the Submarines were Bottled Up by the British When They Sank Old Cement-Filled Men-of-War in the Fairway at Zeebrugge: This Remarkable Picture was Captured from a German Airman and was Snapped While Flying at Low Altitude. A Large Portion of Each Sunken Vessel Is Visible Because of the Ebb Tide

How the Men in German Prison Camps Sleep: The Crowded Beds are Improvised on the Floor, Each Man Using His Crude Chair, Made at His Expense, to Protect His Feet from Passers-By. The Picture was Procured from a French Soldier Interned in Switzerland

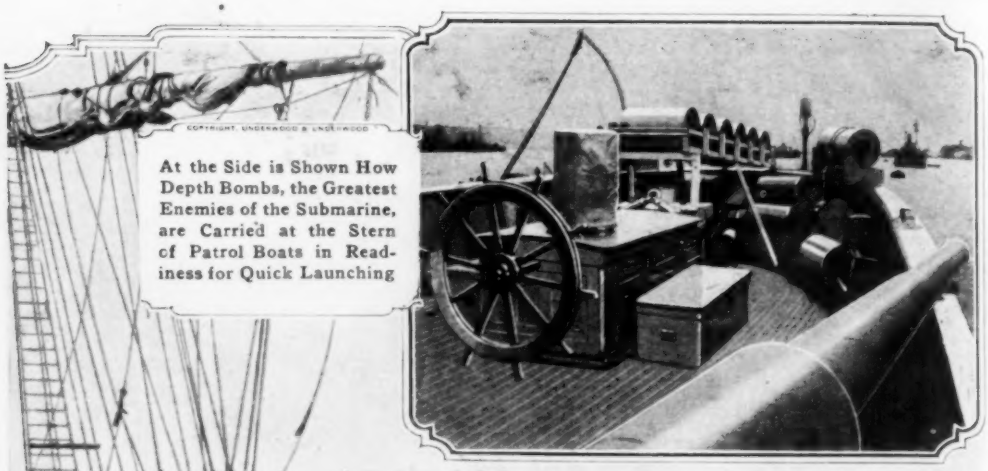
WHERE OUR ITALIAN ALLIES BATTLE IN ALPS

Above is Given an Interesting and Picturesque View of an Important Machine-Gun Position near Val Sugana in the Trentino District, Where the Italians and Austrians have of Late been Engaged

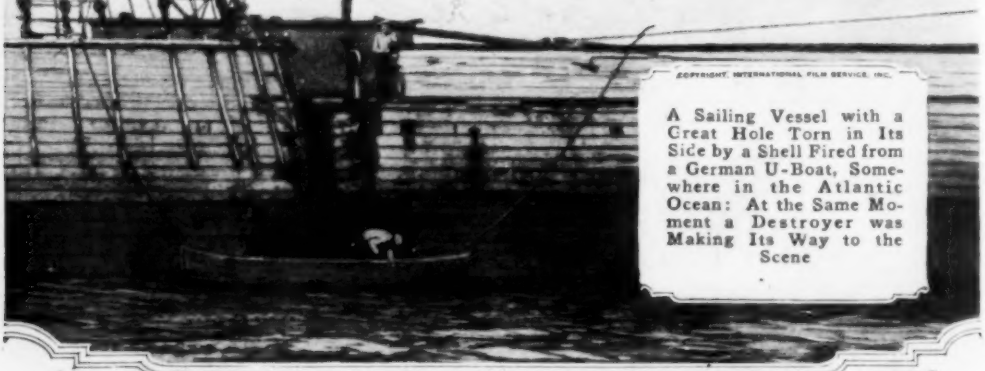
Austrian Airmen Are Little Better Civilized than Those of Germany, and Therefore Sandbags Protect This Field Hospital in the Mountains between the Brenta and Piave Rivers

Here Is an Impressive View of a Strongly Intrenched Italian Position in the Vicinity of Val Sugana, Which Is the Eastern Portal That Gives Access to Trent in the Tirol

PHOTOS FROM BOSTON PHOTO NEWS CO.



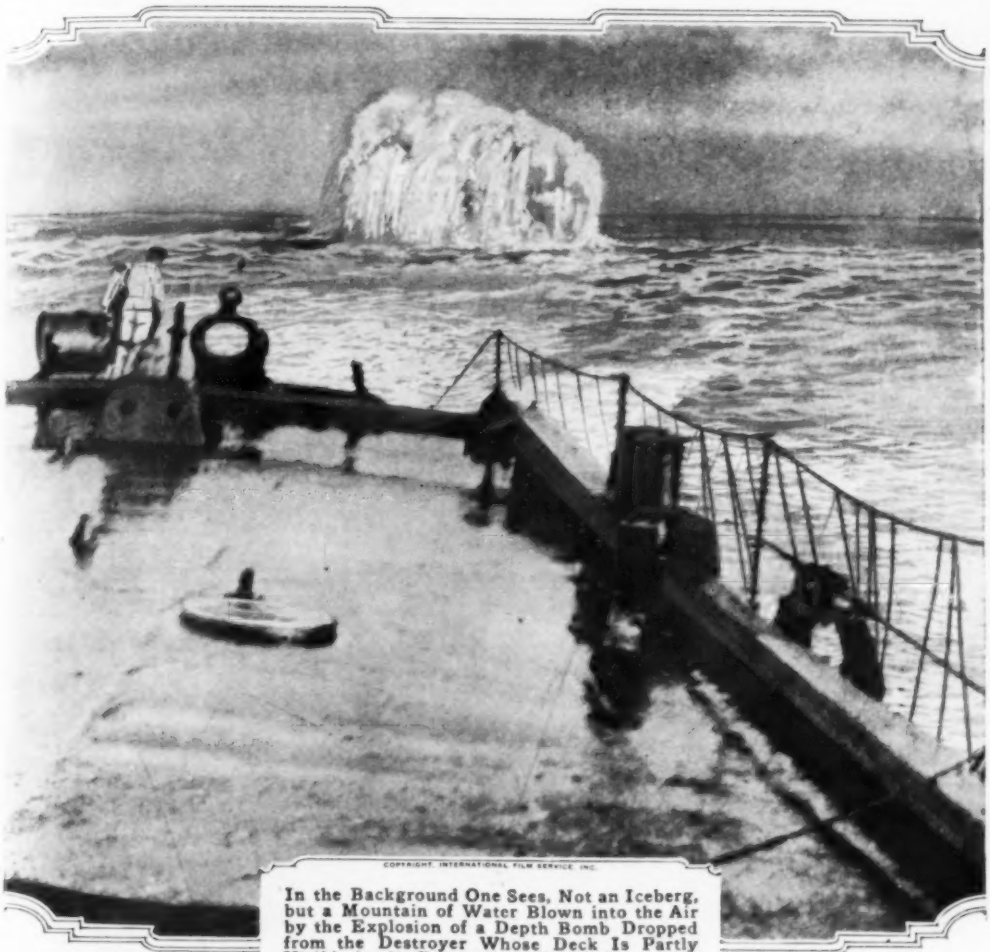
At the Side is Shown How Depth Bombs, the Greatest Enemies of the Submarine, are Carried at the Stern of Patrol Boats in Readiness for Quick Launching



A Sailing Vessel with a Great Hole Torn in Its Side by a Shell Fired from a German U-Boat, Somewhere in the Atlantic Ocean: At the Same Moment a Destroyer was Making Its Way to the Scene

Crew of an Ill-Fated Merchantman Adrift at Sea: In the Boat at the Right Is One Seaman Whose Lack of Attire Indicates the Haste in Which He was Forced to Leave the Ship. The Other Boat is Nearly Swamped

DESTROYER'S VICTORY OVER HUN U-BOAT



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In the Background One Sees, Not an Iceberg, but a Mountain of Water Blown into the Air by the Explosion of a Depth Bomb Dropped from the Destroyer Whose Deck Is Partly Visible in the Foreground. Right Now Submarine "Fishing" Is the Greatest of All Marine Sports

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Disabled by a Depth Bomb: A German U-Boat Rising to the Surface, Its Crew Ready and Willing to Surrender in Order to Escape the Fate Planned for the Helpless Sailors of the Merchantman Which had Been the Object of Its Attack

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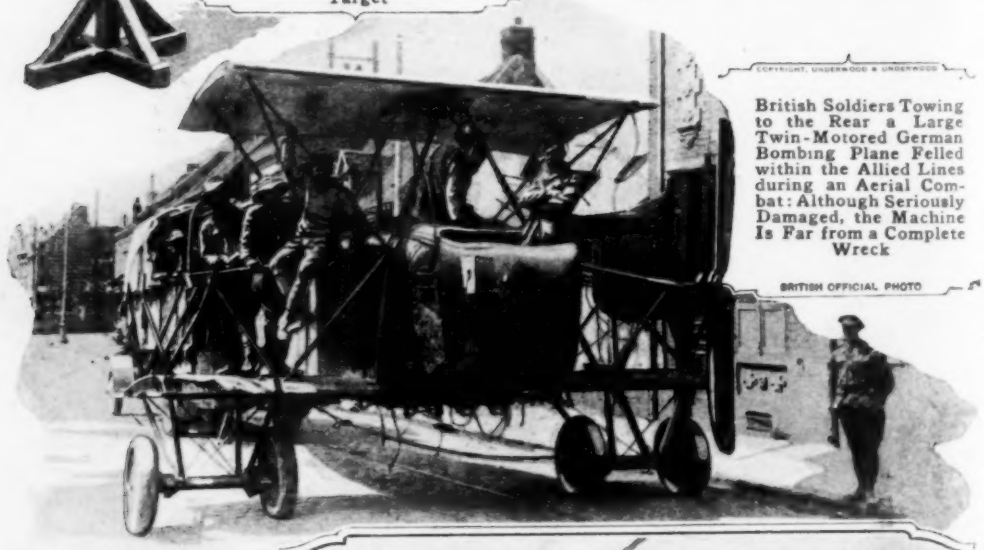
Student Airmen at a School of Aerial Gunnery Learning to Wing Enemy Air Craft with Machine-Gun Bullets: The Miniature Plane at the Left is Operated by Clockwork and When Placed at a Considerable Distance is Used as a Practice Target



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British Soldiers Towing to the Rear a Large Twin-Motored German Bombing Plane Felled within the Allied Lines during an Aerial Combat: Although Seriously Damaged, the Machine Is Far from a Complete Wreck

BRITISH OFFICIAL PHOTO

BRITISH OFFICIAL PHOTO

Using a Range Finder to Determine the Elevation of a Flying Hun Approaching Overhead: The Information is Immediately Telephoned to Anti-Aircraft Batteries

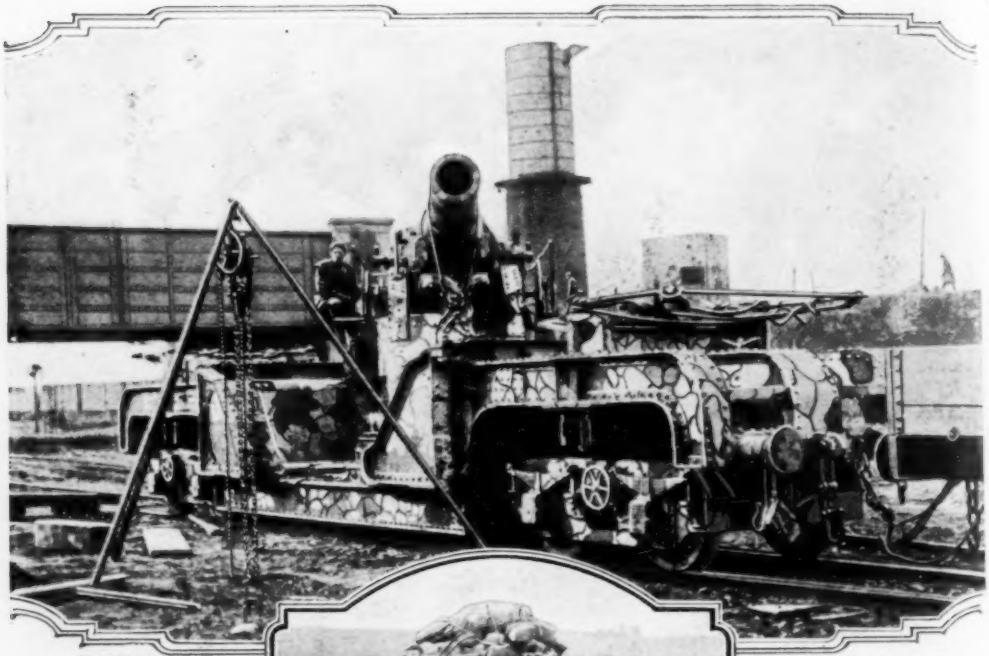
AERIAL COMRADES AT HOME AND OVERSEAS

As the Plane, Visible Above, Flies over the Building Which Serves as a Large Camera Obscura. Its Line of Flight is Traced on a Mapping Board and the Information Communicated to Advance Posts

The Three Spots Visible beneath the Aeroplane Above Are Bombs That have been Launched Horizontally and have Not Yet Attained Perpendicular Positions

The White Circle Is a Bombing Target for Cadet Fliers. The Pitted Character of the Ground Shows the Results of Many Practice Bombardments

The Baby and Its Giant Brother: The Caproni Triplane, the Enormous Italian King of the Air, and the Caproni Monoplane, Known as the "Wasp." The Picture Gives a Striking Idea of the Great Difference in the Size of the Tiny Fighters and Big Bombing Planes



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Camouflage Painting Is Not a Permanent Form of Art, but It has the Distinct Merit of Giving Greater Permanence, or Life, to the Things It Protects than They Might Otherwise Enjoy. Here Is a Good Example of It

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One of the Medium-Sized Armored Tanks Used by the British Forces: Machines of This Type do Not Replace the Heavy Tanks, but They Are Faster and Exceedingly Useful

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There Is Nothing Soft about the Artilleryman's Job, Despite All of Our Mechanical Aids. Stripped to the Waist, Members of a Gun Crew Work Like Trojans. The Gun Here Shown has Just Fired a 12-Inch Shell

AND HIS HUN-STRAFING PARAPHERNALIA

Add a Cold Drizzling Rain to This Picture, and One Gets an Idea of the Kind of a Quagmire No Man's Land Is during Many Months of the Year. British Troopers are Shown Advancing across Shell-Torn Ground

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Tommy Atkins Has a Mechanical Bent, and This Is the Way He Utilizes It to Convert a Machine Gun into a Full-Fledged Anti-Aircraft Post

Behind the British Lines: Making Cable by Twisting Telephone Wires with the Aid of an Improvised Apparatus That is Driven by Power Transmitted from One of the Rear Wheels of a Motor Truck. When Something is Needed at the Front, There Is Always Some One Who Knows How to Make It

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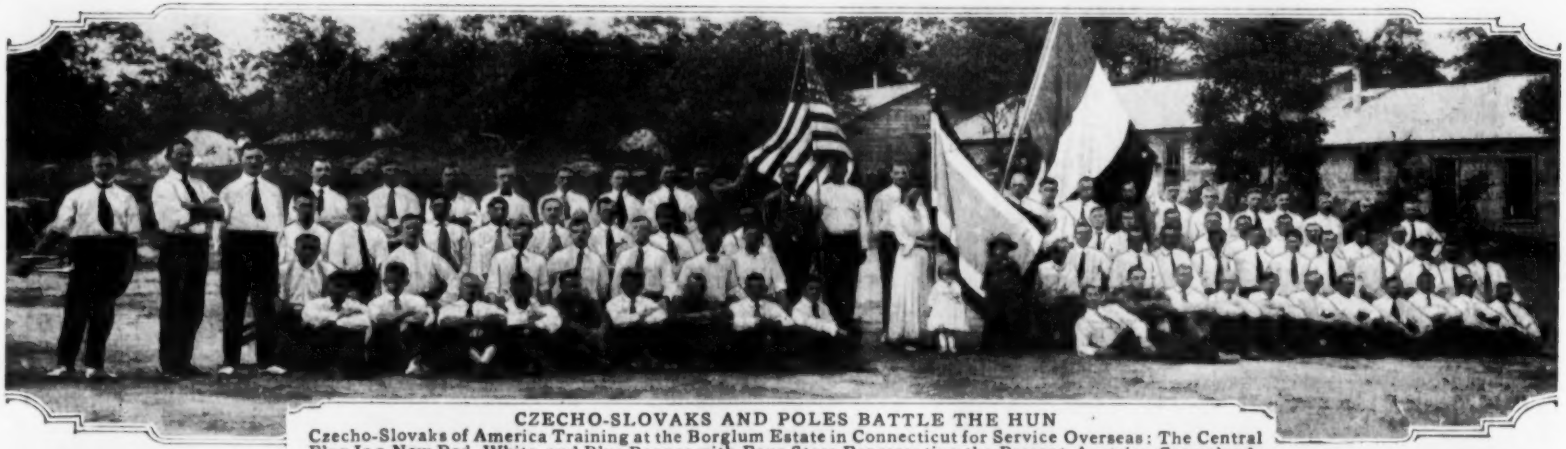
Portable Telephone Station Used in Conjunction with an Observation Balloon: Information Supplied by the Observer is Transmitted to the Posts Where Needed



CZECHO-SLOVAKS AND POLES BATTLE THE HUN

Czecho-Slovaks of America Training at the Borglum Estate in Connecticut for Service Overseas: The Central Flag Is a New Red, White, and Blue Banner with Four Stars Representing the Present Austrian Crownlands Bohemia, Slavonia, Moravia, and Silesia, Which are Seeking to Unite as an Independent State

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This Picture, Taken Before the Second Battle of the Marne had been Won, Shows a Polish Regiment Marching to the Front to Share in the Task of Turning the Huns from Paris

Recruited and Trained in the United States for the Polish White Cross: The First Contingent of Polish Nurses to be Ready for Service in the War Hospitals of France

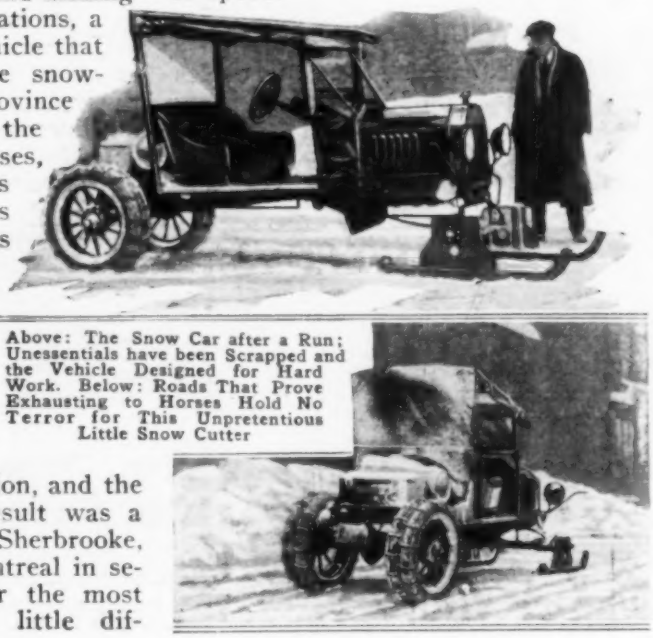
SEISMOGRAPH IS EQUIPPED WITH ONE-TON PENDULUM

The largest vertical seismograph in the western hemisphere has recently been installed in an observatory in Cleveland, Ohio. The instrument is of extraordinary sensitiveness, recording slight disturbances of the earth occurring at great distances. Several years were occupied in perfecting it, one of the problems to be overcome being the fashioning of springs of sufficient sensitiveness and yet capable of holding great weight. The pendulum of this instrument weighs 2,500 lb. and consists of a big steel drum filled with gravel, attached to the end of six flat steel springs that project from a wall. The position of the pendulum with respect to the earth is such that it records vertical disturbances, while other instruments are provided for recording horizontal disturbances. The registering device is of the ordinary type.

The Largest Seismograph in the Western Hemisphere: The Pendulum, Weighing 2,500 Pounds, is Hung from Springs So Sensitive That the Instrument Is Extraordinarily Susceptible to Vertical Disturbances in Any Part of the Globe

HYBRID CAR PASSES ROADS BANKED WITH SNOW

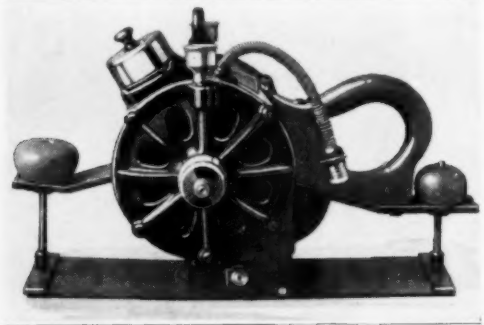
By substituting runners for the front wheels of a light roadster and making a number of other modifications, a Canadian has evolved a vehicle that successfully negotiates the snow-packed highways in the province of Quebec. In remodeling the machine for winter purposes, it was stripped of all frills and fitted for the serious business of traveling roads that are occasionally impassable to horse-drawn sleighs. The gear ratio was lowered, the seat dropped by eliminating the body, and the tread narrowed. Extra rims were attached to the rear wheels to double the traction, and the fenders removed. The result was a hybrid that traveled to Sherbrooke, Quebec, Toronto, and Montreal in severe winter weather, over the most unattractive roads, with little difficulty and at a surprisingly good rate of speed.



Above: The Snow Car after a Run; Unessentials have been Scrapped and the Vehicle Designed for Hard Work. Below: Roads That Prove Exhausting to Horses Hold No Terror for This Unpretentious Little Snow Cutter

POWER PLANE MUCH FASTER THAN JACK PLANES

An electric planer is being introduced which is used like an ordinary jack plane and imparts a smooth surface to



Electric Planer with Which One Man can Do as Much Work as Several Men Using Jack Planes

wood regardless of grain or knots, it is said. The cutting is done by rotary blades operated by a small motor which forms part of the tool. The base can be adjusted so that a curved or flat surface can be finished with equal ease, 500 to 700 sq. ft. being the amount which, it is estimated, one man can plane in eight hours.

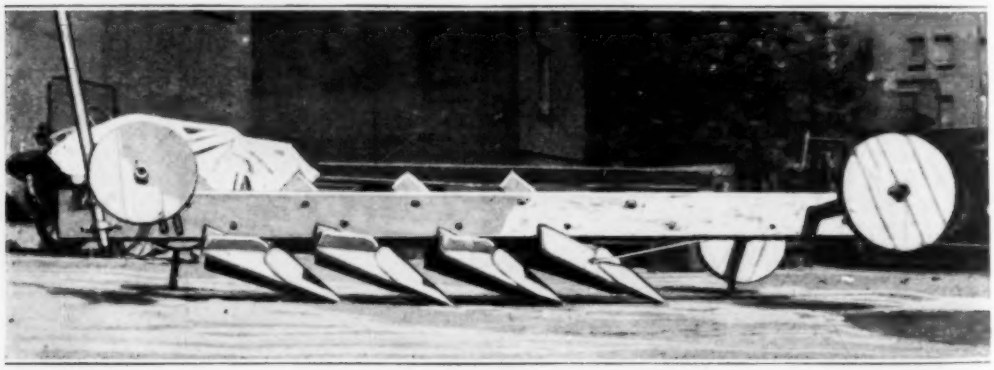
SUBMARINE CABLE-LAYING PLOW USED IN EAST

In laying submarine telephone cables across marshes on the coast of Long Island, an odd submarine trencher has been successfully employed. It consists of a long timber beam that is carried on wheels and holds beneath it, in tandem, a series of four wedge-shaped plows. In use, the apparatus is drawn by a wire rope that extends to a motor-driven winch installed on high ground. Under ordinary conditions it cuts a trench 14 in. deep at a rate of about 40 ft. a minute.

WORK BEGUN ON ONTARIO POWER PROJECT

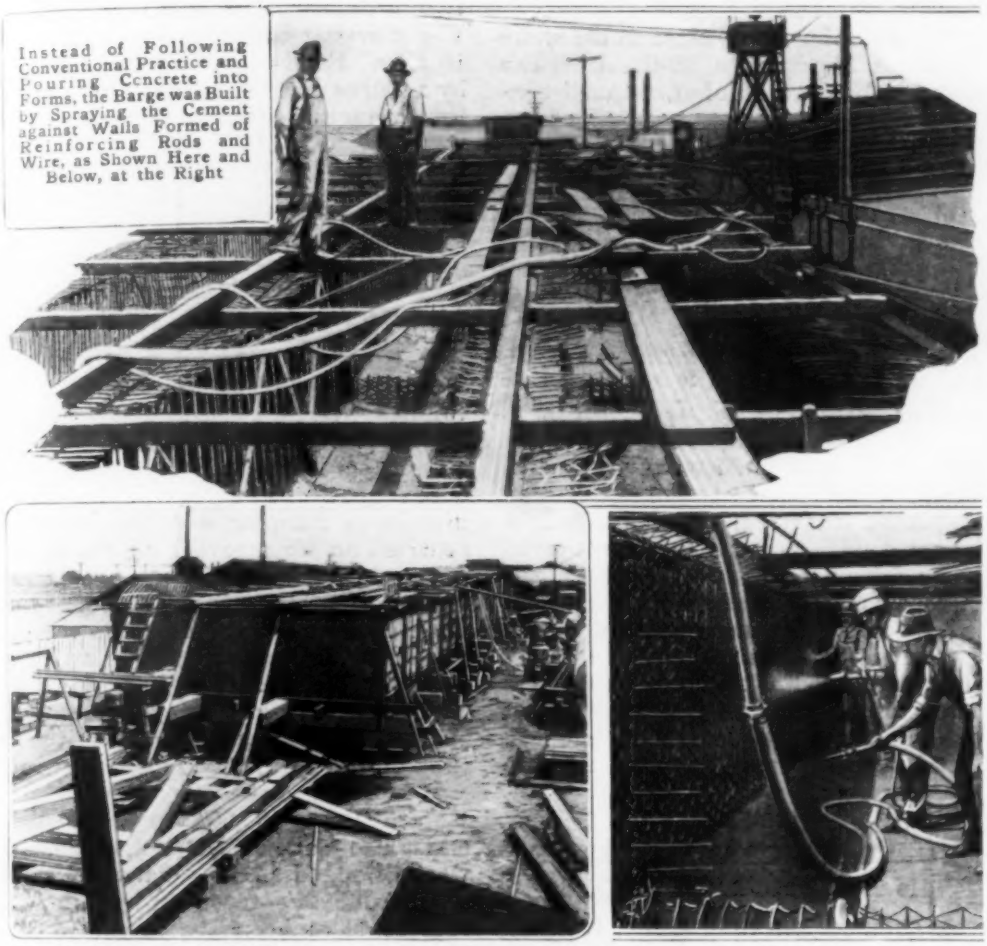
Work has begun on the great power project of the hydroelectric power commission of Ontario, which will involve the diversion of 10,000 cu. ft. of water per second from Niagara River, and will result in the development of 300,000 hp. The work includes the digging of a canal, some 12 miles long, with an intake about two miles above the falls. The power plant will be located down the gorge at the end of the last rapids. That the commission may enlarge its facilities if considered advisable, it has purchased extensive tracts of land through which two additional canals can be dug. The building of the power plant and the digging of the canal now contemplated will require a total excavation of about 15,000,000 cubic yards.

¶ The wearing of three pairs of gloves, of cloth, rubber, and leather, respectively, is being urged in some quarters for linemen working with live wires. The cloth gloves should be worn next to the hand to absorb perspiration.



A 14-Inch Trench is Cut as the Underwater Multiple Plow is Pulled Forward. At the Same Time the Cable is Fed into the Furrow from a Boat at the Surface. The Work is Completed by Filling the Ditch

CONCRETE BARGE IS BUILT WITH AID OF CEMENT GUNS



Instead of Following Conventional Practice and Pouring Concrete into Forms, the Barge was Built by Spraying the Cement against Walls Formed of Reinforcing Rods and Wire, as Shown Here and Below, at the Right

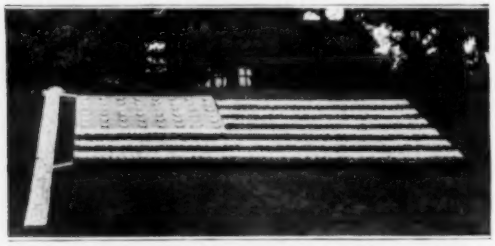
The Barge was Blocked on Its Ways So That, When Completed, a Big Truck could be Moved under It on Rails Previously Laid, and the Vessel Transferred to the Water without Suffering the Usual Shocks of Launching

Novel methods of construction have been employed by the Los Angeles Harbor Commission in building a reinforced-concrete barge. Instead of pouring the material in forms, according to conventional practice, air guns have been employed and the cement sprayed against walls formed of reinforcing rods and wire. The plan is one that is commonly used for other kinds of work, but its application to barge and boat building, except perhaps for applying finishing touches, is not general. During construction the barge was blocked on its ways so that when completed a heavy truck could be run on rails beneath it. Upon being lowered to the latter, it was moved into the water and allowed to float free. This simple plan of launching relieved the barge from the usual strains and shocks to which vessels are ordinarily subjected at such times.

¶ Carloads of fish are being shipped weekly from the Gulf of Mexico to Nashville, Louisville, and Indianapolis, under government supervision, in order that these inland cities may have fresh fish at low prices. The Food Administration is sharing in this service, which is to be extended to other cities.

SCHOOL PUPILS MAKE FLAG OF CONCRETE AND STONE

On a sloping bank, close to the shore of Lake Superior, a 19-ft. American flag has been made of stones and con-



Flag of Concrete and Stones, 19 Feet Long, Made by the School Children of Escanaba, Michigan, on the Shore of Lake Superior: The Emblem can be Seen Far Out on the Water

crete by school children of Escanaba, Mich., aided by their superintendent and some workmen. The unusual patriotic display attracts the attention of boats far out on the water, as well as of those who frequent the park where it is located. The stones used are from 2 to 4 in. in diameter and are partly sunk into a bed of concrete, 6 in. thick. The smooth blue field is of cement, set with white stars made of small pebbles. Two coats of paint give the flag its proper colors.

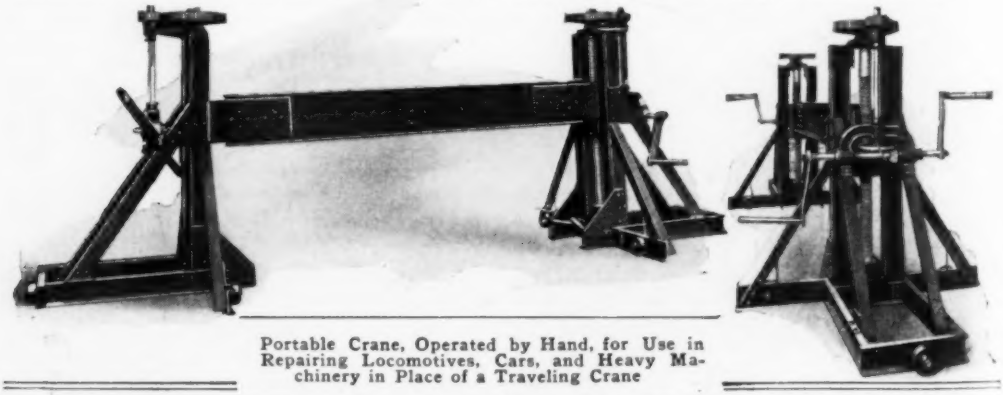
PORTABLE CRANE FOR USE IN LOCOMOTIVE SHOPS

A compact portable crane, recently placed on the market as a substitute for a traveling crane, is designed for handling locomotives, cars, and heavy machinery during repairs. The complete outfit consists of four jacks and two crossbeams, forming two units. The working capacity of the outfit is 60 tons. Each of the jacks is operated by a pair of handles transmitting power through gearing to a vertical screw, which raises and lowers the adjoining end of the crossbeam. The jacks are moved about on small cast-iron wheels, so mounted that the jacks can be lowered by removing certain pins.

CURFEW TO ANTICIPATE RETURN TO OLD TIME

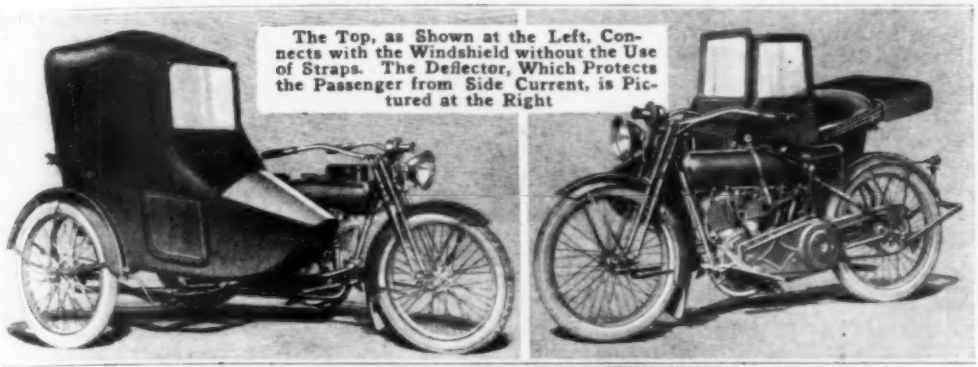
Anticipating that all clocks in the country will be turned back one hour on the last Sunday in October, the authorities in an eastern city have ordered that the curfew bell, which usually is rung at 9 p. m., shall be sounded an hour earlier on the Saturday night before the change. This will remind the people that their timepieces must soon be set according to the old schedule. In order that none may forget to make the change, it is urged that all persons in the town reset their clocks and watches when the curfew is rung on the Saturday night referred to.

¶More than 100,000 tons of rock, enough to make 500,000 bbl. of cement, was dislodged in the quarry of a cement company recently by what is said to have been the largest single blast ever used in the cement industry. The explosive was placed in holes 105 ft. deep, forming a semicircle.



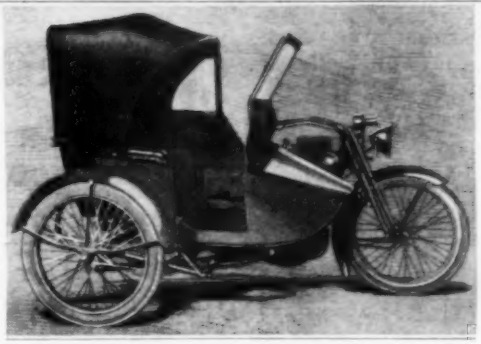
Portable Crane, Operated by Hand, for Use in Repairing Locomotives, Cars, and Heavy Machinery in Place of a Traveling Crane

TOP AND WINDSHIELD MAKE SIDECAR STORM-PROOF



The Top, as Shown at the Left, Connects with the Windshield without the Use of Straps. The Deflector, Which Protects the Passenger from Side Current, is Pictured at the Right

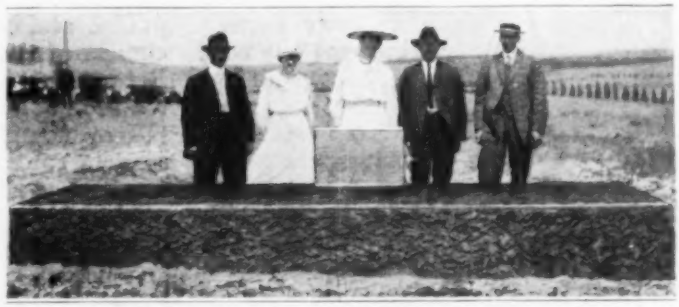
Motorcyclists who utilize sidecars will be interested in a neatly designed top and windshield of current introduction. A side deflector, which is a part of the shield, screens the passenger from the current of air thrown off by the motorcycle, and also gives ample protection against the mud and water often splattered by the front wheel. A side curtain, which may be carried under the seat when not required, permits the car to be completely inclosed so as to be storm-proof. No strap is used in front to hold the top in position. Furthermore, the latter is so arranged that it does not interfere with the cyclist's view of cross streets. When a sharp turn is to be made, the windshield does not prevent a full swing of the handlebars nor free movement of the driver's arms.



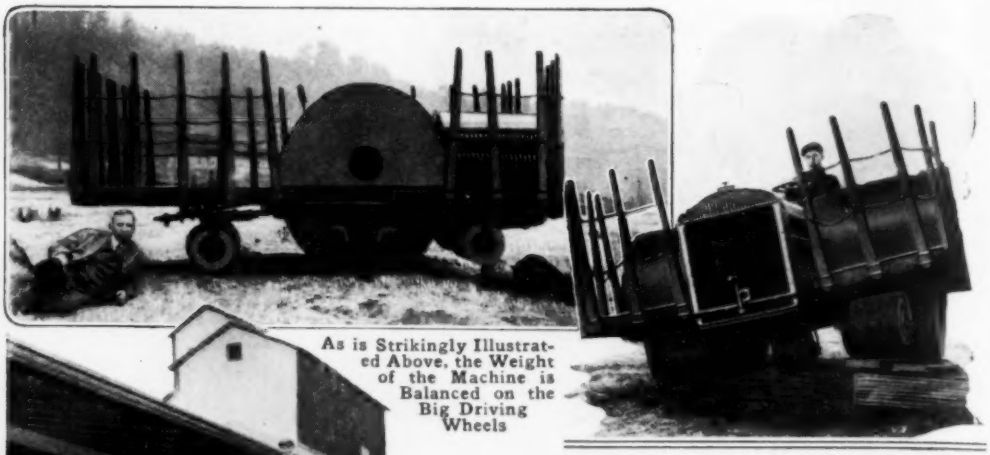
The Top and Windshield do Not Interfere with the Free Movement of the Handlebars

COUNTY ERECTS MEMORIAL TO ITS WAR HEROES

Special interest attaches to the soldiers' monument recently dedicated in Klickitat County, Wash., because it is one of the first memorials erected in this country in honor of American fighters who have given up their lives since the United States entered the war. It is made of artificial stone and consists of a plain, massive slab, laid flat on the ground. A bronze plate mounted above it bears a suitable inscription and the names of six men from the county who have died in France within recent months for freedom and to help make the world safe for democracy.

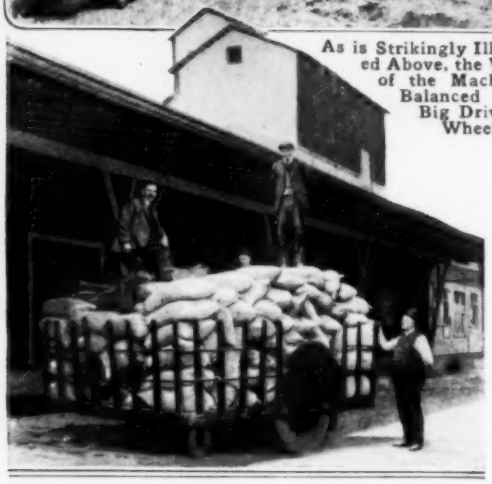


Plain, Massive Slab Recently Dedicated in Maryhill, Washington: The Bronze Tablet Mounted above It Contains the Names of Six Men from Klickitat County Who have Died in France



As is Strikingly Illustrated Above, the Weight of the Machine is Balanced on the Big Driving Wheels

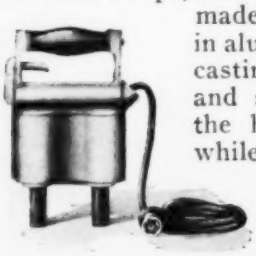
Showing How the Wheels Are Able to Adjust Themselves Independently to Road Conditions, to Surmount Obstructions without Capsizing



Even When Burdened with a Seven-Ton Load, the Tractor, Because of Its Broad Tread, Is Able to Negotiate Mud and Sand

ELECTRIC HAND MAGNET HAS ALUMINUM CASE

An electric hand magnet for use in machine shops, foundries, etc., is being made, wholly inclosed in aluminum. An upper casting forms the yoke and switch cover, and the handle support, while a lower casting incloses the coil, and from its underside project two soft-iron poles. The switch lever, operated by the index finger, is located just below the handle. Current is supplied through a flexible cord. This magnet is used in clearing chips from machinery, separating iron from brass, cleaning molding sand, dipping can covers, and for many other purposes.



ODD MOTOR TRUCK IS BUILT LIKE MODIFIED DOLLY

Because of its unusual design and performance, more than ordinary interest is found in a heavy-duty motor truck of current development. The machine has two large driving wheels of 30-in. tread on which the load is balanced. They are independent of each other in all respects, so that they can be revolved in opposite directions, and are driven by sets of four internal wheels that travel on the inside of the large driving wheels as on endless tracks. Swivel casters are provided at opposite ends to maintain balance. The frame is 9 ft. in width, and instead of being rigid, is jointed. This arrangement enables the broad wheels to adjust themselves separately to road conditions, so that, regardless of side grades and obstructions, there is little chance of the truck being overturned. Because it may be spun around like a top, it is able to make quick turns, partial or complete, on narrow, difficult road in spite of its unusual width and cumbersome appearance. Unlike most trucks this one improves soft roads as it traverses them, for its broad wheels are analogous to those of a steam roller. Its generous bearing surface enables it to negotiate sand and mud with ease when carrying a seven-ton load.

TO BUILD VAULTS TO HOLD VALUABLE WAR PHOTOS

The government being without adequate storage facilities for the safekeeping of quantities of photographic records and motion-picture films relating to the war, the War Department has authorized the building of spacious fireproof vaults where this material, which will come to possess great historical value, can be kept. The vaults will be located in one structure, but separated by fireproof walls and each provided with its individual fireproof door. A ventilating system will keep the vaults at the proper temperature.

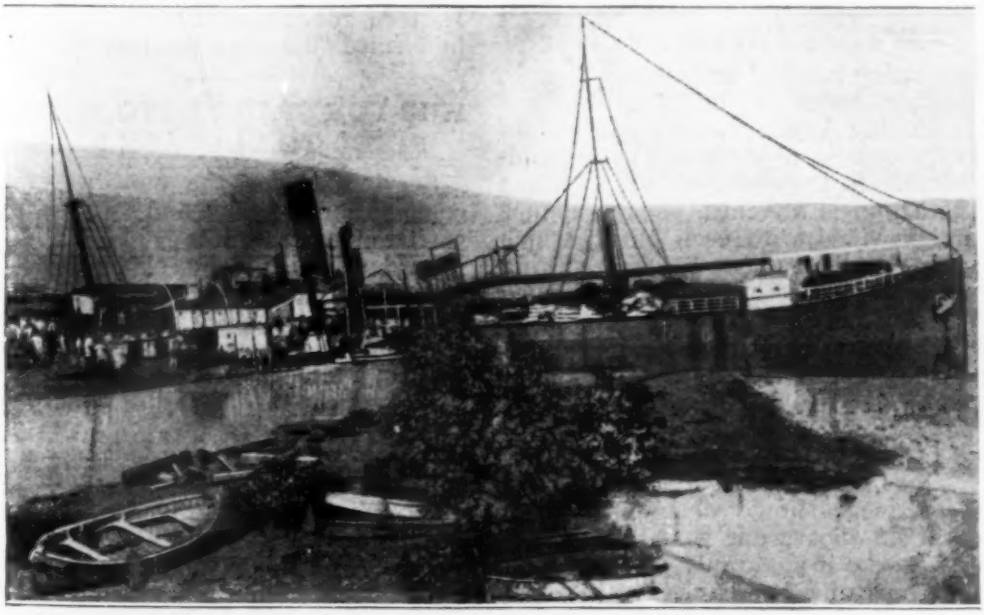
STEAMSHIP "HELLENIC" TAKES FIRE WHILE AT SEA

In mid-July, fire was discovered aboard the steamship "Hellenic" when it was a day's voyage off Papeete, the principal port in the French Society Islands. The ship was loaded with a full cargo of flour, and bound for Sweden from Sydney, Australia. It succeeded in reaching the quay at Papeete with half of its cargo still in good condition, its machinery uninjured, and all hands safe.

SHEEP MORE PROFITABLE THAN A LAWN MOWER

With the present scarcity of wool and mutton, a resident of a Chicago suburb has found it highly profitable to abandon his lawn mower and substitute therefor two lambs, purchased early in the summer for $8. The animals are removed from their back-yard inclosure at intervals and allowed to

These Two Lambs, Which were Purchased for $8 Keep This Suburban Lawn Well Cropped and Occasion Their Owner Little Trouble. At the Same Time They are Rapidly Increasing in Value

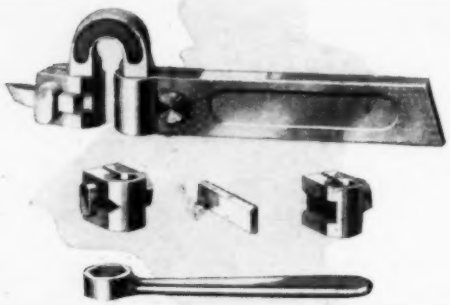


Aflame and Listing Badly, the "Hellenic" as It Appeared upon Reaching Papeete: At the Time, It was Hoped That Much of the Cargo might be Saved

graze on the lawn, keeping it evenly cropped and lending a picturesque touch to the home's surroundings. A patriotic desire to add something to the country's wool and market supply gave the owner special interest in his experiment. But for their purchase in this way, the lambs would have been slaughtered while still small, whereas by late fall it is expected that they will sell for $16 or more.

SPRING-HEAD TOOL HOLDER IS ADJUSTABLE

A tool holder of new design, having an adjustable spring head, is adaptable to a large variety of accurate work such as cutting internal or external threads, making holes in boiler plate, and fashioning keyways. At one end of the shank is a U-shaped spring, adjustable to the right or left, to which the clamp is attached. Three clamps are provided with each outfit, which take round, flat, or square cutting members respectively. It is claimed that this holder will stand more strain without chattering than a rigid holder.



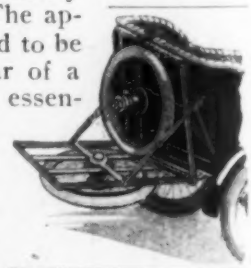
New Tool Holder, with Adjustable Spring Head: The Two Additional Clamps, Shown Detached, and the Wrench Are Part of the Outfit

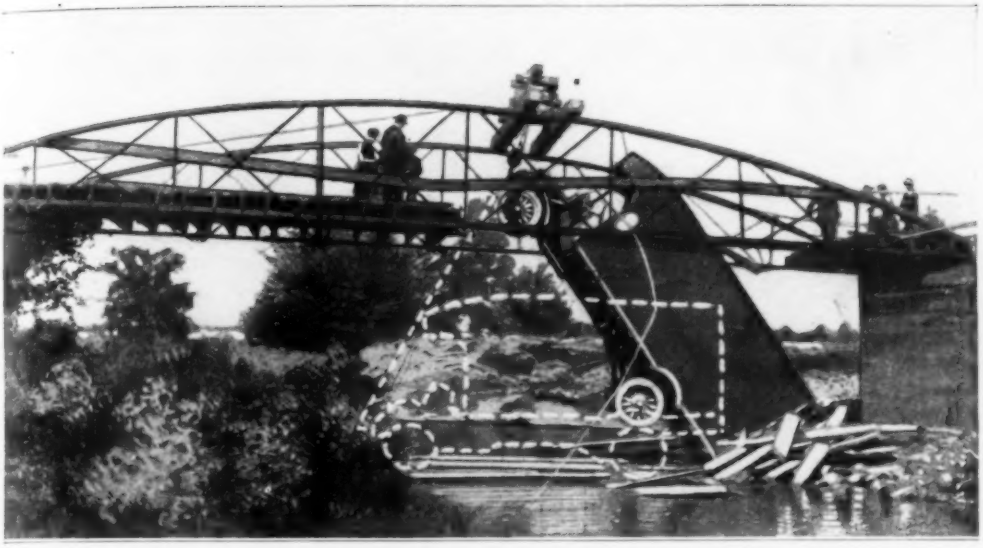
PROPOSE NAVY OBSERVE NEW TIME SYSTEM AT SEA

It has been suggested that the Navy Department should change the time observed aboard our vessels at sea so as to make it conform to that used on the ships of other navies with which we are coöperating. In formulating a new system, it is pointed out, it would be advisable to conform chiefly to the plan the British Admiralty has in effect, while also observing the provisions of our daylight-conservation program. The British Admiralty has designated the area between the meridians 7½° east and west of Greenwich as zero, and numbered positively the 15° intervals westward therefrom, and negatively those eastward, to the international date line, where the last intervals each way are plus and minus 12. The French, in inaugurating a similar standard time, numbered from zero to 23, going eastward around the globe. Also they provided for hour-ahead time in summer, which was not done in the British navy. Now it is proposed that the United States abandon astronomical time at sea and establish time zones by 24 meridian subdivisions, which would be determined by the mean solar times of meridians at 15° intervals west and east of Greenwich, and divide into two time zones the division containing the international date line. The Greenwich meridian zone, by this system, would be designated as "zero zone." Those westward would be known as zone "one west," etc., to "twelve west." Eastern zones would correspondingly be termed "one east," and so on.

HUB FOR SPARE AUTO WHEEL FIXED TO LUGGAGE RACK

Serviceable for the motorist is a combination luggage and spare-wheel carrier that has lately been designed. The apparatus is intended to be hinged at the rear of a car, and consists essentially of a folding rack which is supplied on its face, or underside, with a dummy hub that accommodates a wheel. The contrivance is of neat, stanch construction and will be found particularly useful for the automobilist who does considerable touring.





Except for a Few Minor Scratches, the Heavy Motor Van Survived the Mishap without Damage

HARD FALL FAILS TO WRECK HEAVY MOTOR VAN

Like the window washer who fell eight stories and went back to work a few minutes later, a heavily loaded moving van of large size recently broke through the floor of a country bridge in Pennsylvania and escaped damage. The flooring gave way beneath the eight tons of weight and allowed the rear end of the truck to fall to the bank of the creek below. The front end, however, was supported by an iron girder. To extricate it, the front of the machine was lowered onto a floating platform, after the bridge girder had been removed. Then the van was able to move away under its own power.

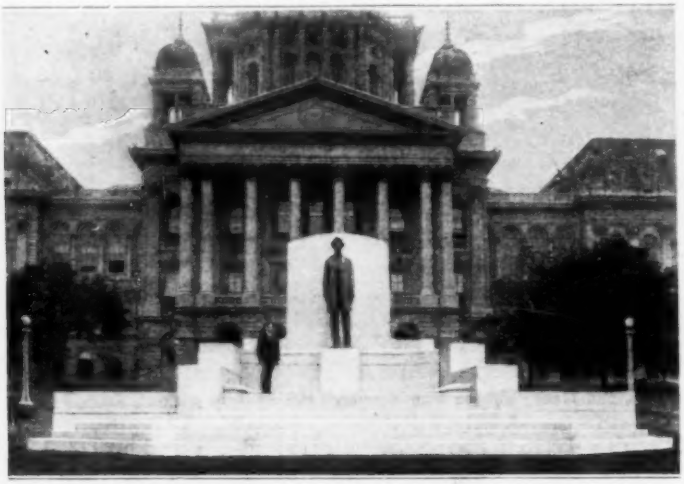
ECLIPSE IN WEST SNAPPED BY CAMERA FACING NORTH

In the unusual picture of the eclipse shown herewith the boy holding a pane of smoked glass was facing west, while the photographer's camera, which was facing north, caught a reflection of the eclipse in a window which faced south. Undoubtedly the explanation is that the boy's pane of glass was turned at an angle which reflected the image of the eclipse onto the window to the north, while the window in turn reflected the image to the camera, which was operated by the boy's brother and held directly south of the window.

A Photograph of an Eclipse Which Is a Puzzle in Reflections: The Boy Is Looking Toward the West through Smoked Glass, While the Camera Which Took This Picture Faced North

NEW STATUE OF LINCOLN IN ILLINOIS CAPITAL

A new statue of Abraham Lincoln, which has received much favorable comment, has just been erected in front of the east entrance of the state capitol at Springfield, Ill. It represents the Civil War president, with bared head bent slightly forward, as he is conceived to have appeared when he solemnly bade good-by to his friends in Springfield before setting out for Washington to assume heavy tasks. The figure stands on a broad pedestal of light-gray stone, and immediately behind it rises a plain panel of the same material. The statue was erected at a cost of fifty thousand dollars.



New Statue of Lincoln Erected in the Capitol Grounds at Springfield, Illinois, as a Feature of the State's Centennial Celebration: The Monument Cost 50,000 Dollars

BIG WAR FORTUNES MADE IN BERGEN, NORWAY

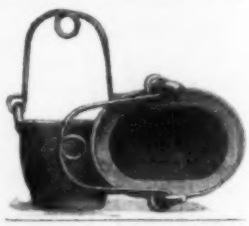
An index to the big war-time profits which many people in neutral countries have been making is to be found in the last annual report of the seaport of Bergen, Norway, which has a population of about 80,000. The incomes of the people increased from $72,500,000 in 1916, says the report, to $90,500,000 in 1917.

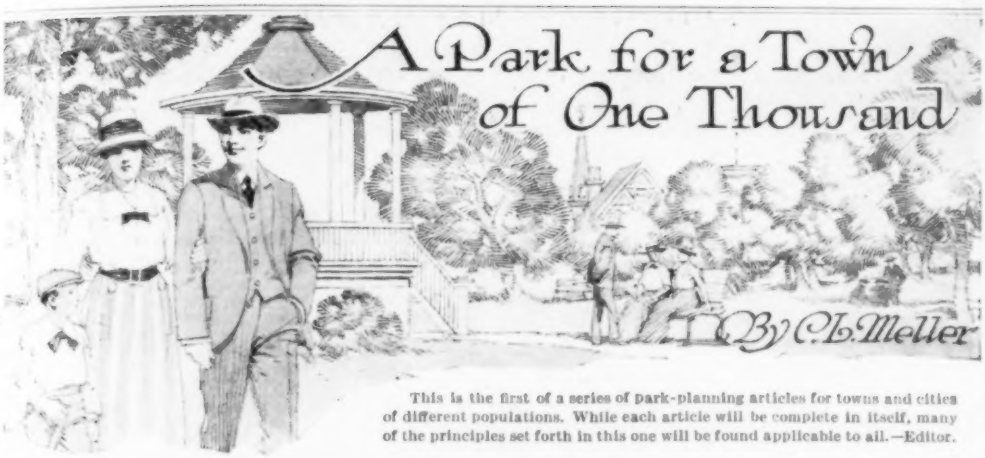
BRITISH GAS STANDARD IS PROPOSED FOR AMERICA

It is proposed to adopt the British standard for gas, which is 528 British thermal units per cubic foot of gas. The director for the oil division of the Fuel Administration has submitted the proposition to various state public-utility commissions for discussion. Its purpose is to conserve oil which is largely used in making fuel and lighting gas, the Fuel Administration being interested primarily in reducing all oil requirements to a minimum. The proposed order would supersede all previous standards for candle-power and British thermal-unit value in artificial gas. The standard maintained in Great Britain is now in effect in Massachusetts, and is practically the same as that adopted by the French.

OVAL SOLDERING POT FOR LINEMEN

An electric-lighting company has provided its linemen with soldering pots each having an oval mouth and a lip extending around the inside just below the rim. The latter feature prevents spilling of the contents when raising or lowering the pot. Because of the shape of the container, solder dripping from the wire is more apt to be caught than with a round pot, providing it is properly hung. An extra-long bail gives ample room for handling the ladle.



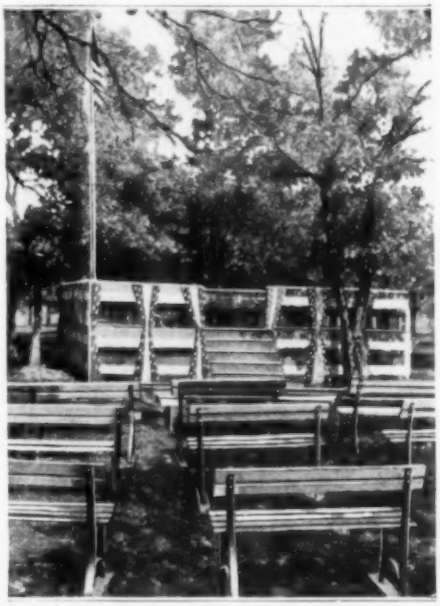


A Park for a Town of One Thousand

By C. L. Meller

This is the first of a series of park-planning articles for towns and cities of different populations. While each article will be complete in itself, many of the principles set forth in this one will be found applicable to all.—Editor.

THE necessarily small area at the disposal of a town of a thousand requires that the layout of the park be of a simple design. Also the design must be sincere, and sincerity applied to park design may be variously interpreted. Rugged honesty always creates a good impression, therefore one must not attempt, in the first flush of enthusiasm, any elaboration of design which will require a continuous maintenance expense beyond the town's means. Take for instance flower beds. They are an expense that repeats itself each year. Likewise, shrubbery plantings and perennial borders need attention each year in the way of cultivating, pruning, and watering, if such plantings are not to become untidy and a detriment to the appearance of the park. Here, then, is one meaning of the word sincerity as applied to park design. Never lay out a planting, however desirable it may appear, unless you are certain that the money is forthcoming to maintain it at its best. Flower beds in themselves are not bad, and shrubbery plantings, properly placed, are always in good taste, but to be honest with ourselves and our town we must take into account the maintenance expense of the park.



An Inexpensive and Well Placed Band Stand Suitable for a Small Park

Again sincerity requires that when planning our park we take into account its use as a place to foregather. This means open spaces, and we cannot scatter trees, shrubs, and flowers everywhere and anywhere. We must seek to locate our plantings more toward the outer edge of the park area. In so doing, we can arrange the shrubs and flowers we desire to use in a manner that will make the planting pretty from the outside of the park as well as from the inside. This same argument finds us unwilling to copy the parks of a larger town, since in a larger town the different parks serve different purposes, and an area likely to be available for park purposes in a town of one thousand would in a larger town be devoted either to a playground or to

a very formal planting, depending upon its location. Either purpose is out of the question in such a park as we have at present under discussion.

The value of music there is none to dispute, and a band stand becomes virtually a necessity. In a small area, a band stand will dominate the scheme of things ever so much more than in a large park. This should be taken into account when laying out the park. It may be needless to say that the band stand should be of simple and well-balanced design, and must be so located that the music will carry easily to those who come to hear it. Perhaps it would be best to consult a good bandmaster in respect to this matter. The band stand can of course be placed in the center of the park, but in some instances the boundaries may be such as to make it advisable to place it more to one side. In such instances, the band stand can be treated as the point in which the entire scheme of the layout comes together, as it were. In locating a band stand it must not be forgotten that occasions will arise when it will be needed as a speaking platform. That the speaker may have his audience all in front of him, either in the park or else congregated in the street passing the park, is one of the objects that should be sought in locating the band stand. Placing it thus need not interfere with its value for music.

Path Surfaced with Waste Concrete, Allowing Grass to Grow in the Cracks, to Help Bind

A lawn is the foundation of a park. Nothing looks better nor conveys a greater sense of tidiness and prosperity than a well-built and well-kept lawn, while, on the other hand, nothing so quickly creates a bad impression as a poorly graded and badly maintained grass surface. Preparation means permanency, and while grass will grow anywhere, slighting the work or preparation dooms the lawn to be but a temporary affair that will fail when the vicissitudes of climate test its staying qualities. Grade, which local conditions must determine, proper tillage, manure, and seed mixture are the essentials, and careful attention must be paid to each of these factors. The advice of an expert in such matters is desirable, for money spent in supervision and direction of the work should be regarded as safeguarding the investment.

There is also the item of maintenance that must be taken into account. The grass will require mowing and rolling, and always to be at its best, some reseeding should be done occasionally.

Trees are placed in a park for shade and the symmetry or ruggedness of their outline. This determines for us the location and spacing of the trees. The more room a tree has in which to grow, the heavier its top will be and naturally the more shade it will give, while at the same time such a tree will gain its characteristic growth sooner and in a much greater degree than a crowded individual. Only enduring kinds, of species that are native to the region, should be used. If spacing trees the proper distance for their best future development seems too open and bare in its newness, then faster-growing, short-lived varieties can be planted among the permanent trees for immediate effect, the latter to be cut out as soon as they begin to crowd. Trees that may happen to be on the area selected for a

park should be judiciously thinned, and the best preserved, even if such individuals are not exactly located where we might wish them to be. The years of growth that a large vigorous tree represents makes it abundantly worth while to modify the arrangement of the park a little to accommodate the location of a few trees.

Trees along the edge of the park will act as street trees and serve the park at the same time. Since the entire park area is to serve as a gathering place, it will be well to avoid trees whose habit of growth carries their branches too near the ground. In this matter one should be guided by the fact that a few well-located and well-grown specimens are worth any amount of decrepit tree growth.

Another Inexpensive Band Stand of Good Design: A Canopy Stand may be Placed in the Open, but Seats should be Placed in a Shady Spot, if Possible

A shrub really needs more standing room, so to speak, than a tree, and as it is more than likely that the area available for park purposes will be none too large to adequately accommodate the throngs that may use it on various occasions, it becomes evident that shrubs should not be planted except for very special reasons. In the angles of the walks, and in places around the edge of the park, shrubs can sometimes be used with good effect. It will seldom if ever be advisable, however, to inclose the park area entirely in shrubbery, as this would sever the park too much from its immediate surroundings—the very thing we must seek to avoid in a small park more or less in the heart of the town. There should be abundant opportunity to look into and even across the park. Where shrubs are to be used, the arrangement should be such that the tall ones are to the rear with the smaller ones to the front, and of course, nothing but perfectly hardy material is to be used.

A path in a small park is not an addition to its beauty, and should be merely tolerated, never invited. Where a park is so located that it is natural for people to walk through it in passing from one place to another, then let the paths conform to this fact. It does not follow that the lawn need be cut up with a number of straight lines; for people will as readily and as automatically follow an easy and natural curve as a straight line. A large bowlder, a shrubbery clump, or even a tree properly placed, are excellent devices wherewith to give a reason for the curve in the path. In the matter of paths, each park will

A Fountain with a Centerpiece Built of Shells Imbedded in Concrete: The Sides of This Fountain could be One-Third as High with Good Effect

present a distinctive problem, and undoubtedly in some parks a frank geometric treatment of the paths will be the best solution of the problem. There is a large variety of surfacing material to select from in covering the paths, but in most instances the item of expense will limit the surface to such material as is to be had close to hand. The native soil, well rolled, makes an excellent path, while the encroachment of the grass upon the path is rather to be desired than hindered.

A park is incomplete unless there are adequate seating facilities. As to the number of seats to be provided, the aim should be to have about enough to supply the everyday needs. Movable seats have the advantage over stationary seats in more than one way. A group of people can place the movable seats to suit themselves for the time being, and no restrictions ought to hinder their use in this manner. On special occasions movable seats can easily be arranged around the band stand in the manner of an amphitheater. Ordinarily the seats ought to be located near the paths or in such places as would make them not only freely but naturally accessible. A movable seat can be stored in winter, which adds considerable to its life. Very reasonably priced park seats of good design can be purchased from a number of manufacturers.

Architectural, or other, ornamentation of the park had best not be attempted, for sufficient means will seldom be forthcoming to make such attempts anything but a temporary affair that will sooner or later betray its lack of permanent character. A fountain, however, is one feature that can be introduced with the promise of a satisfactory effect, provided it be borne in mind that a fountain is primarily for the display of water and not an excuse for statuary or some rustic effect or other. It goes without saying that running water must be available.

As for a monument, it will prove a very difficult matter to locate in a well-balanced manner both a statue and a band stand. The band stand must have the preference, for if this be accorded the monument, half the purpose of the park will be defeated. If the park be made a setting for the monument, where is the town going to have its concert, and where shall the town folk have their outdoor celebrations of all kinds? Such a park may be quite a show place, but it will take too much out of the community life of the town actually to make the best impression. After all, we Americans have no use for showing off in any of its forms, and it is the park that serves its purpose which conveys that sense of genuineness we value so highly.

TABLE FOR COMPUTING INITIAL COST OF PARK AND MAINTENANCE EXPENSE

Given: A piece of land, 360 by 250 ft., with heavy clay soil, rough in condition, uneven, and weed-grown

Estimating 2½ hours hand labor and 1½ hours team labor for every 1,000 sq. ft. of area gives:

Hand labor, 220 hours.
Team labor, 135 hours.

Rain during process of work would have reduced work by approximately 10 per cent.

Lighter soil would have reduced work by 10 per cent to 20 per cent.

Digging and replanting trees of goodly size with large ball of earth about their roots requires 36 hours of hand labor per tree.

Digging trees up in late fall and allowing the ball of earth to freeze as the work progresses requires about 24 hours of hand labor.

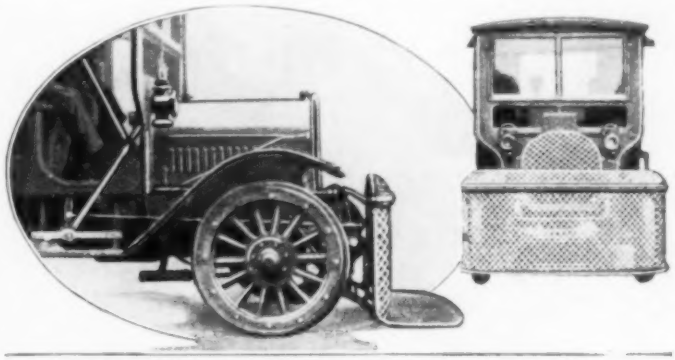
This includes loading and unloading if tree is to be moved any distance. Team labor will of course depend on hauling distance.

Maintenance of area, 360 by 250 ft., requires approximately 620 hours during season from April 1st to November 1st. This includes upkeep of accessories and care of all plantings. The degree to which the park is used and the standard set for its upkeep are appreciable factors in the cost of maintenance.

Stating this in a different form, it will require the work of one man for two days each week to keep the above area laid out as a park in an excellent state of maintenance. This includes the upkeep of all accessories such as benches, band stand, paths, etc.

CAR FENDER OPERATES AUTOMATICALLY

A fender is now being manufactured for trucks, delivery cars, etc., which operates automatically and consists of a vertical wire shield with rounded top and ends, at the lower edge of which is a horizontal apron. Usually the fender is attached to the front of the car so that the apron is level with the front axle. In case an object is struck, the fender being supported by sets of parallel bars and cushion springs, automatically recedes and drops downward, lessening the shock. The attachment can also be raised and lowered by the driver from his seat, so that it can be adjusted to escape high obstructions on the road.



Front and Side Views of a New Automobile Fender: The Latter Shows It in the Lowered Position into Which It Automatically Drops When It Strikes an Object

ALL LETTERS FOR PERSONS IN GERMANY REWRITTEN

According to regulations now in force, persons in this country who wish to communicate with relatives in Germany must write out their messages in one of the Red Cross chapters. The messages are then sent through the division offices to the national headquarters, where they are rewritten and the wording absolutely changed to prevent the sending of any code or cryptogram. The messages are then given to the censorship board and passed or refused by them, as the case may be. When they reach a neutral country they are translated on other paper and delivered by the Red Cross of the place to which they go. The plan is considered well-nigh spy-proof. The Red Cross is now sending about 1,300 letters daily to persons behind the enemy's lines.

CREEPERS ENABLE TRUCKS TO VIE WITH TANKS

Demonstrations have shown that army-type trucks equipped with creeper treads are able to negotiate with ease rough territory devoid of roads. The idea was tried out some weeks ago with a small roadster that attempted to emulate the feats performed by the

Steep Grades and Soft Ground Have No Terrors for This Delivery Truck, Which has been Equipped with Creeper Treads of the Kind Used on Army and Agricultural Tractors

tank, "Miss Britannia," that has been touring the nation. Since then it has been adapted to larger cars. Even 60-per-cent grades are climbed and quagmires traversed without difficulty. On the level ground a truck thus equipped is said to travel at the rather surprising speed of 15 miles an hour.

DANGER SIGNAL IS DEVISED FOR DARK COUNTRY ROADS

To warn nighttime motorists when they approach dangerous curves, bridges, and railway crossings along country highways, a self-maintaining signal has been designed. It consists of a special reflector housing a red bulb. When mounted on a short post, properly installed at one side of a road so that it catches light rays from the lamps of oncoming cars, it reflects a red glow that attracts attention. Provision is made for displaying an advertising placard immediately above the reflector, and a road sign below it.

This Signal is Well Suited for Country Highways, for It Uses Neither Fuel nor Electric Current

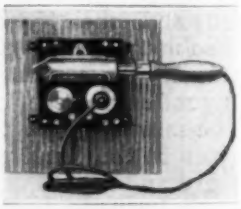
AMERICAN-MADE OPTICAL GLASS NOW PLENTIFUL

The enterprise of one of the large optical companies in this country, before the war, combined with timely coöperation on the part of government authorities as soon as the United States entered the conflict, has resulted in creating an American-made supply of optical glass adequate for war needs. When the war began in 1914, this concern had been operating an experimental optical-glass plant for two years, but previous to that time this product, so essential to the manufacture of fire-control instruments, etc., was imported from Europe. In 1911 other optical companies in America began experimenting in making optical glass, but in spite of these efforts the situation had become critical, from a military standpoint, by the time the United States entered the great conflict.

In April of last year the geophysical laboratory of the Carnegie Institute, at the government's request, placed a party of scientists in the plant of the first-mentioned concern, and these two agencies concentrated every effort to produce a suitable glass. Later similar aid was given other firms. Today adequate quantities of optical glass of the kind needed for military fire-control instruments, etc., are being manufactured.

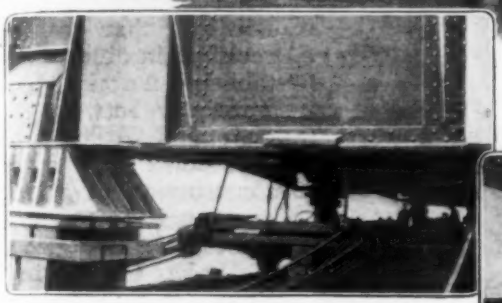
ELECTRIC SOLDERING IRON WITH AUTOMATIC RACK

With a view to overcoming difficulties in heat control common to many types of electric soldering irons, an outfit has been placed on the market which has a rack that automatically reduces the current when the iron rests on it. The rack projects from a panel, mounted above the workbench, and operates somewhat like a telephone receiver. When used to support the iron, resistance is inserted in the circuit, preventing the iron from becoming too hot but not allowing it to cool. On the panel, also, is a push-button switch and a receptacle for the plug of the flexible cord connected with the iron.

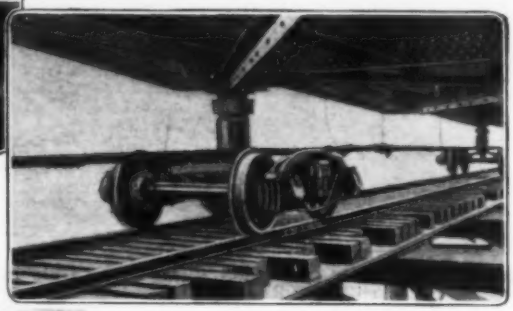


MOVE BIG RAILWAY BRIDGE ON FREIGHT-CAR TRUCKS

A Portion of a Bridge Weighing 4,000 Tons, Mounted on Railroad Trucks Preparatory to Shifting It a Distance of 136 Feet



One of the Front Trucks and Part of the Heavy Tackle with Which the Great Load was Drawn Along



View under One Truss, Showing Two of the Trucks and the Connecting Bar

Forward End of the Bridge, with Cables Running to Hoist Engines Not Shown Here

The moving of a bridge, weighing 4,000 tons, a distance of 136 ft. on railway trucks, was the remarkable feat accomplished a few months ago in order that a longer draw span might be inserted at one end of the structure. The bridge spans the Missouri River at St. Joseph, Mo., and carries trains for three railways, and also highway traffic.

The distance which the three fixed units of the bridge were moved was the difference in the length of the old draw span and the new one, plus space for erecting one of the new piers. Falsework was provided for two standard-gauge tracks, one under each of the trusses. When, after months of preparation, the

bridge was to be moved, it was raised from the temporary blocking placed between it and the piers, by hydraulic jacks mounted on the car trucks. The average load of each jack was 70 tons.

Connecting the trucks were two heavy, spliced steel beams, while joining them to the tackle was a heavy steel crossbeam, attached to the two forward trucks. The power equipment included a double-drum steam-operated hoist and a large-capacity electric hoist. Traffic on the bridge was interrupted only nine hours and 15 minutes and the actual moving occupied but 13 minutes.

MAKE BIG COAL SHIPMENTS WHILE RIVER IS FLOODED

In the brief period of high water on the Ohio River, created recently by increasing the flow from tributaries, coal companies took advantage of the stream's improved navigability by making shipments of maximum proportions. In some instances barges, a score or more in number, were lashed together and towed to their destination with the least possible delay. One such huge shipment is shown in the accompanying illustration and indicates the special efforts being made to prevent a fuel shortage.

Big Consignment of Coal Being Towed in the Ohio River, the Level of Which was Artificially Raised to Permit the Delivery of Fuel to Cincinnati: In Two Days 40,000 Tons of Coal Arrived in That City

¶In the vicinity of Torreon, Mexico, a fruit has been discovered, 25 per cent of the contents of which consists of oil having great value as a lubricant. Extensive cultivation of the fruit is contemplated.

TRANS-FLORIDA WATERWAY TO JOIN GULF AND OCEAN

Advices from Palm Beach, Fla., indicate that the work of dredging the near-by Lake Worth Inlet, which is to provide a 10-ft. channel between Lake Worth and the Atlantic Ocean, will soon be completed. All that then will be required in order to establish a navigable waterway between the Gulf and Atlantic at that point will be the construction of a lock in a canal that extends across the Everglades to Lake Okeechobee. From that body the Caloosahatchee River offers communication with Ft. Myers. West Palm Beach, on Lake Worth, has already become an inland port by the recent opening of a stub canal that connects with the previously mentioned Everglades drainage canal.

BUILDERS AGAIN USING ADOBE BRICKS

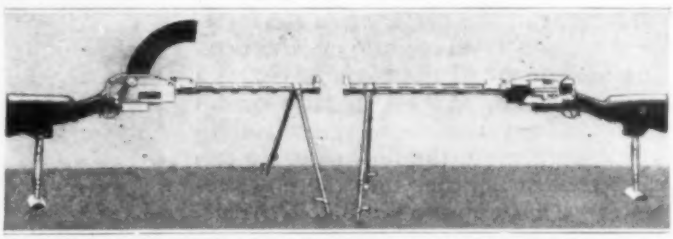
In several instances California builders have reverted to the use of adobe bricks, owing to the scarcity and high prices of other materials, and in making the bricks are employing Mexicans who have long been versed in the trade. To prepare the mud it is placed in a large shallow pit and mixed with straw by means of a large wheel, mounted on a long pole and pushed round and round the pit by man power.

Primitive Method Employed by Mexican Laborers in Mixing Adobe Mud and Straw for Brickmaking: Bricks of This Material are being Used Quite Extensively for Modern Structures on Account of the High Prices of Other Materials

In the center is a barrel with slits in its sides from which flows enough water to moisten the mass properly. Bricks made from this material are very durable.

ODD FEATURES NOTICEABLE IN MADSEN AUTOMATIC GUN

Discussions in the House of Commons of late have aroused much popular interest in the Madsen automatic gun, which the British government came near adopting at the outset of the war. Although tests conducted some weeks ago gave the honors to the Lewis and light Hotchkiss guns, the Madsen is nevertheless a highly ingenious and meritorious instrument. It weighs slightly more than 20 lb., can be fired from the shoulder, and is supplied with a quadrant-shaped magazine. Telescopic legs that fold against the barrel when not in use, are clamped at a point an inch or two back of the front sight. A rear leg is attached to the stock and may be folded in a groove out of the way when not needed. These members facilitate firing from kneeling, sitting, and prone positions. One man, unassisted, can fire 300 rounds of ammunition a minute. No water-cooling paraphernalia is provided. Continuous firing for long periods is made possible by the use of two barrels which may be interchanged in 20 seconds. Thus, one barrel is used while the other one cools, although for intermittent



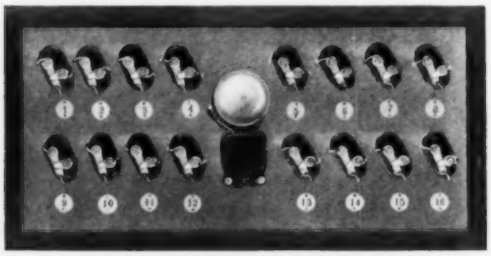
FROM THE SPHERE, LONDON. COPYRIGHT IN THE UNITED STATES BY THE NEW YORK HERALD CO.

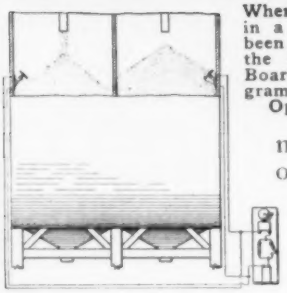
Two Views of the Madsen Automatic Rifle, Which is Admitted to Have a Number of Excellent Features: The Picture at the Left Indicates the Character of the Quadrant-Shaped Magazine. In Recent British Tests the Weapon Won Third Place in Competition with the Lewis and Light Hotchkiss Rifles

firing the machined channels in the barrel provide adequate radiation surface for air-cooling the weapon. The mechanism is operated by recoil in the conventional manner. Single shots may be fired as with an ordinary rifle, if desired. At the beginning of the war 5,000 of the rifles were ordered for the British army, but for some reason they were never manufactured.

ELECTRIC ALARM FOR BINS IN GRAIN ELEVATORS

An electric alarm has been devised for grain elevators which enables the





When Any One of 16 Bins in a Grain Elevator has been Filled to Capacity, the Bell on the Signal Board Sounds. The Diagram Shows How the Grain Operates the Signal

man in charge on the work floor to tell when each bin is full, without having to go up and look at it. A plunger is installed at the top of each bin which is actuated by the weight of the grain when the latter rises to the level of the mechanism. The movement of the plunger closes a circuit, causing a bell to ring on an indicator board. Following the sounding of a warning, the flow of grain can be shifted to another bin, thereby preventing overflow, the mixing of grains, or the clogging of the machinery.

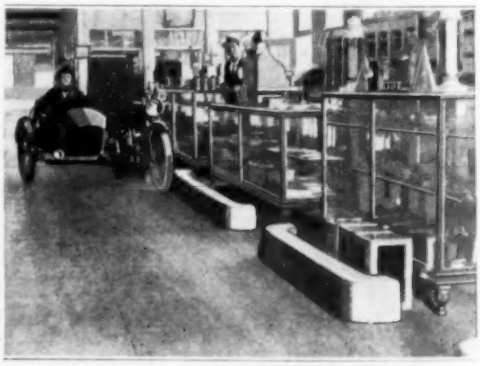
¶ According to reports, the French have recently completed a wireless station which can send messages to Australia, giving it a range of some 12,000 miles.

POST OFFICES TO BE MADE TELEGRAPH STATIONS

In taking over the telegraph and telephone lines of the country, the government proposes to establish a coöperation between these two systems of communication which will be of direct convenience and profit to the country. These wire systems will also be joined to the postal system, and it is proposed, for example, to utilize the branch post offices in the large cities as telegraph stations where messages can be received and perhaps sent as well. By merging the telegraph and telephone lines it is expected that wire service which has been badly congested in certain regions will be improved.

CURBS PROTECT SHOWCASES IN GARAGE SALESROOM

After several motorists had carelessly backed their cars against glass showcases in the salesroom of a garage, the owner devised an effective means of preventing the repetition of such accidents. In front of each display case, a heavy concrete curb was built. The height of these members is sufficient to prevent a wheel from readily passing over them, and their posi-



The Showcases in This Motor Salesroom are Protected against Damage by Heavy Concrete Curbs That Serve as Bumpers When Automobiles, or Other Motor Vehicles, are Carelessly Run into the Room

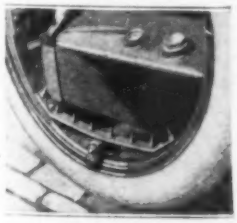
tion is such as to preclude the possibility of protruding fenders reaching the glass panes. Since their installation no glass has been broken.

HARVEST HANDS OBTAINED FROM MAIL-ORDER FIRM

An "order" for two farm hands was filled recently by a large mail-order house on behalf of a farmer, 67 years old, who wrote for much-needed assistance to this concern, with which he had long dealt. Of the tens of thousands of orders filled by the company, this is one of the most unusual. The farmer's letter explained that he had 50 acres of wheat so ripe that it was in danger of being lost, and that the organization on which he had depended for harvest hands, had failed him. The novel request was referred to the employment department of the concern. Less than 24 hours later two men of farm experience were found who could be spared from the force, and were started for the country, arriving at the farm in time to save the wheat crop.

ROW OF SPIKES KEEPS BOYS OFF REAR OF MOTOR CAR

By bolting a spiked bar across the lower, inner part of a tire carrier mounted at the rear of his car, one motorist has devised an effective scheme for discouraging small boys from risking life and limb "hooking rides." The sight of the spikes usually is sufficient to dampen a youngster's desire for hanging to the machine. Possible accidents are thus averted, and the danger of the tire holder being damaged is lessened.



BIG CONCRETE SHIP "FAITH" HOLDS OWN IN STORM

On its maiden voyage from San Francisco to Vancouver, the concrete freighter "Faith," carrying a salt and copper-ore cargo of 4,300 tons, weathered a heavy sea and reached its destination in perfect trim. Gales of 80 miles an hour were encountered, and the stability of the vessel therefore was severely tested. In view of the fact that the "Faith," at the time of writing, remains the largest concrete ship afloat, the result of its first voyage is highly gratifying.

Waves Breaking over the Deck of the Concrete Ship "Faith" during Heavy Storm Encountered on the Maiden Voyage: It Weathered the Sea Easily and Arrived in Port in Perfect Trim

WAR MAKES ITSELF FELT IN STYLES FOR MEN

Pronounced restrictions are being put in force this fall with respect to the styles of men's clothes, that materials may be conserved and labor employed to the best advantage. A typical example of the results of these changes is furnished by comparing the two suits shown herewith. The Norfolk, a last year's model, requires ⅜ yd. more material, 52 in. wide, than the war style shown beside it, and the former utilizes at least 7½ per cent

more labor than the latter, in making. The features which, having been condemned by the Council of National Defense, the tailors are now omitting are:

NO YOKES
NO PLEATS
NO BELT
NO PATCH POCKETS OR BELLOWS POCKETS
NO CUFFS
NO PEG TOP TO TROUSERS
ALSO NO TUNNEL LOOPS COLLARS ON VESTS FLAPS ON VESTS CLOTH BELTS FOR TROUSERS
NO CUFFS
COPYRIGHT

Men's Styles before the War and Now: Three-Eighths of a Yard of 52-Inch Material Represents the Saving in the War-Time Suit as Compared with the Condemned Norfolk, So Much in Vogue a Few Months Ago

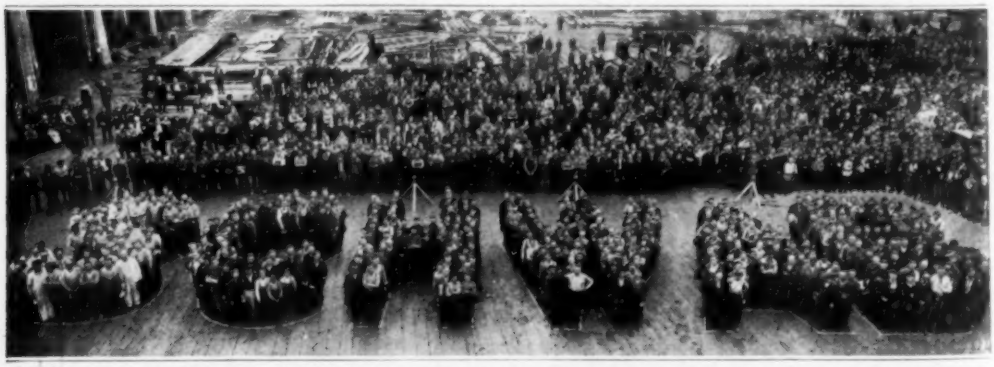
Belts, cuffs, pleats, patch pockets, outside bellows pockets, flaps on vests, vest collars, outside cash pockets, double-breasted sack coats, double-breasted vests, tunnel loops, cloth belts for trousers, peg-top trousers, French facing, and shoulder cloth facing. The new regulations also restrict the length of sack coats, raincoats, and ulsters, as well as the sweep of the two latter. Belts may be only 2¼ in. wide.

HUNS BECOME MORE CAPABLE AS CAMOUFLAGE ARTISTS

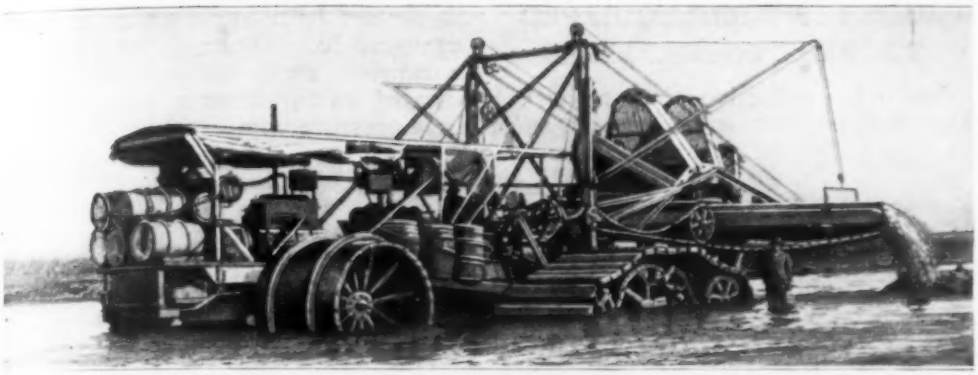
According to a British airman the Germans of late have employed camouflage on a hitherto unapproached scale and have executed the work with great finesse. Miles of canvas, painted to resemble roadways, have been erected to cover the movement of troops. Dummy encampments, villages, factories, and aerodromes have been established to confuse aerial observers. So carefully has some of the work been carried out that even when flying at comparatively low heights, airmen have been completely deceived on a number of occasions some time ago. Cleverly executed work often confuses even the most experienced aerial observers.

"SCHWAB" IN LIVING LETTERS SPELLED BY SHIPBUILDERS

When Charles M. Schwab, director-general of the Emergency Fleet Corporation, visited a big shipyard at Tacoma, Wash., some time ago, he was greeted in an original manner by the workmen. In a roped-off area in front of the great crowd of men before whom he appeared, several hundred shipbuilders grouped themselves in a formation that outlined in living letters the name "Schwab." On the occasion of Mr. Schwab's visit the yard launched its fourth 7,500-ton vessel. Sixteen months earlier the site was submerged beneath 20 ft. of water.



This Portrays the Manner in Which Tacoma, Washington, Shipbuilders Greeted the Director-General of the Emergency Fleet Corporation When He Visited Their Yard



Because of Its Broad Creeper Treads, the Big Machine Was Able to Work Its Way across the Pond without Difficulty

CREEPING TRENCHER DIGS CHANNEL ACROSS POND

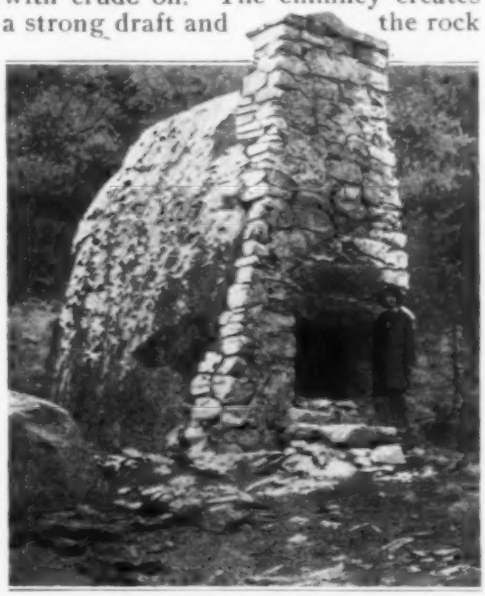
In the process of reclaiming some California swamp land along the Sacramento River, a large ditch-digging machine was put to an interesting test. It was desired to excavate a 700-ft. channel about 5½ ft. wide and 8 ft. deep across a shallow pond. The heavy machine, mounted on broad creeper treads, "waded" through the water and completed the dredging in a 10-hour period. At times the water half covered the big apparatus, which continued its work without interruption.

TO FLOAT SAWED LUMBER ACROSS NORTH SEA

Believing that there will be a shortage of tonnage after the war, a company has been formed in Stockholm, Sweden, which proposes to raft large quantities of sawed lumber across the North Sea. While this method of transportation has been used in shipping logs, there have been few, if any, previous attempts to float sawed material long distances at sea.

HOLLOWED BOWLDER USED AS PARK INCINERATOR

In an unfrequented part of Yosemite National Park is an incinerator made by building a stone chimney against the perpendicular side of a huge bowlder, thus inclosing a natural cleft in the latter which has been slightly enlarged for use as a fire pot. Here the refuse from various camps is brought daily and burned, after being sprinkled with crude oil. The chimney creates a strong draft and the rock becomes very hot, so that ordinarily even noninflammable materials are consumed.

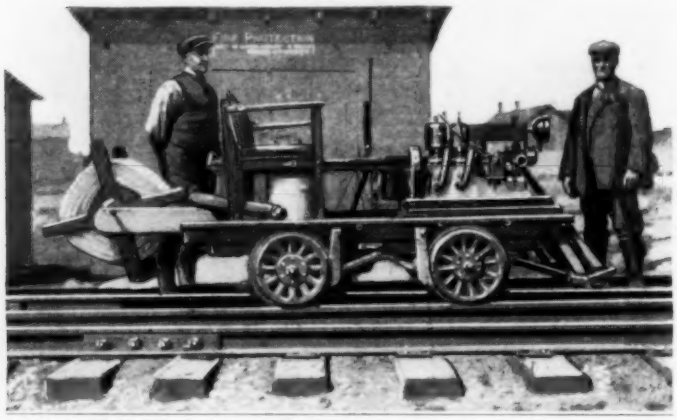


Incinerator for Waste Materials in Yosemite National Park, Made by Erecting a Chimney beside a Bowlder Having a Cleft in Its Side

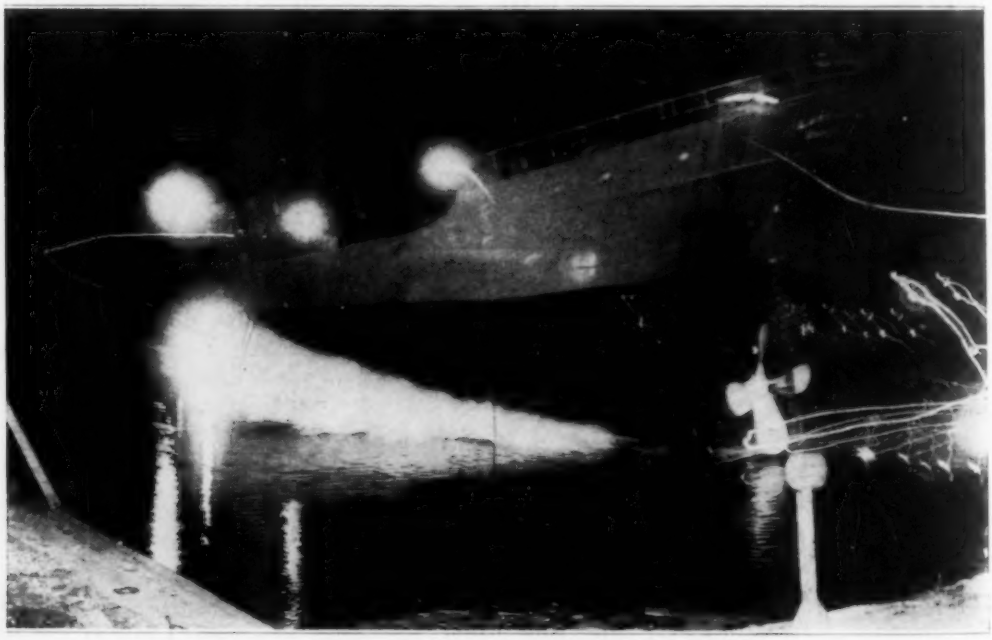
¶A screw fastener for wool-bale bands has been devised by an Australian inventor, which enables the bales to be made tighter than at present and also saves steel by permitting the use of narrower and thinner bands.

MOTOR SPEEDER EQUIPPED TO FIGHT FOREST FIRES

Far more effective than a bucket brigade is a motor-driven speeder, such as section hands use, which has been equipped for fighting forest fires near a railroad right of way in Ontario. Carried on the front is an aluminum-base pressure pump, so light that it can be transported by two men if occasion demands. With it water can be thrown 30 ft. from a nozzle attached to 1,500 ft. of hose, which winds on a reel projecting from the rear of the car. An electric headlight and a fender—both useful chiefly in clearing the track of wild animals—are part of the equipment. The car can carry seven or eight men and their fire-fighting tools, is capable of excellent speed, and can also pull a trailer.



A Railroad Fire Engine for Fighting Forest Fires: The Pressure Pump Is Able to Throw Water 30 Feet from the 1,500 Feet of Hose, Here Shown Wound on the Reel



LAUNCH BOAT FOR WAR FLEET AT MIDNIGHT

JUST one minute after the clocks of Superior, Wis., struck 12, midnight, ushering in July 4th, this unusual photograph was taken, showing the steamer "Lake Aurice" slipping from its brilliantly lighted ways into the water of Lake Superior. Explanation for launching the vessel at such an hour is found in the intense rivalry that existed among shipbuilders for the honor of sending the first hull into the water on Independence Day. So far as is known, the forehandedness of this firm won first place for it without question.

NEW YORK LANDING PIER MADE EXTRA STRONG

In rebuilding an uptown landing in New York, on the Hudson River, which was badly damaged by ice floes last spring, special means of reinforcing have been employed. The former double pile bents have been replaced by triple pile bents, making a very strong foundation. Between the upper and lower series of heavy timbers, or rangers, resting on the piles is a course of diagonal 5-in. planking which adds much to the stiffness of the pier. On the surface is a fine concrete floor, doubly reinforced and so anchored to the structure below that it acts as an immense horizontal girder to transmit and distribute shocks and stresses.

TINY MODEL OF NAVAL GUN NOVEL RADIATOR DEVICE

Among the latest radiator ornaments designed for motor cars is one that reflects the war. It is a miniature model of a light naval gun and somewhat unusual in that it portrays very faithfully the chief mechanical details of such instruments. The gun is about eight inches in length and, including the disk base on which it is mounted, five inches in height.

SHOE-LACING MACHINE SAVES MAKERS' TIME

A necessary step in the making of fine shoes, the lacing of the sides of the tops with thread so that they can be drawn down tightly over the last, heretofore has been done manually by skilled workers, but now a machine has been constructed which performs the operation accurately and skillfully. It stands 16 in. high and is provided with a set of adjustable, power-driven spindles, which share in the threading process. The operator places the two sides of the shoe top with the eyelets back to back and then slips them over the spindles. Slight pressure on a foot lever starts the machine, and the thread quickly passes through the eyelets, after which it is tied in an unyielding knot. The location of this knot can be varied so that the two edges are held exactly the desired distance apart.

This Machine Performs an Important Step in the Manufacture of Fine Shoes, Namely, the Lacing of the Sides of the Top Together, So That the Upper can be Drawn Down Tightly over the Last

ALL-STEEL WORK STAND HAS MANY USES

The all-steel work stand shown herewith is a fixture suited to many different uses in the office or shop where metal furniture is used. It stands 32 in. high and is 26 in. wide and 16 in. deep. Bolted to the legs, which are of angle iron, are either one or two trays, according to the style desired, while the drawer beneath the top is a feature which is optional in both styles.

"On every road and communicating trench leading forward a watcher is stationed whose sole business it is to see that every soldier, entering the zone forward, has his mask at the position of 'alert.'"

THE DEFENSE AGAINST GAS

By E. T. BRONSDON

The text of this article has been passed by the United States Military Censor

"PREPARED ZONE!!! WHERE IS YOUR GAS MASK?"

Twenty miles back of the first-line trenches on the Toul front this sign guards each artery of advance. Incoming American troops here are required to know the exact whereabouts of their masks; also each man on entering the zone is commanded to keep the pouch containing his mask, night and day, within 30 yards of his person, and in such condition that it can be put on instantly.

The reason for selecting this distance is that all men in military training are supposed to be able to cover 30 yards at a run and adjust their masks while still holding their breath from the time of alarm. The actual time consumed in taking the protector from its pouch, unfolding it, and fastening it in place should never exceed six seconds.

The forward limit of the "prepared zone" is roughly seven miles back of the front-line trenches, giving it an extent of 13 miles. Here the "carry zone" begins, which extends to a line two miles in the rear of the firing bays. In the "carry zone," the gas mask is even more of a necessity. The regulations demand that every soldier carry his own on his person night and day. While marching, resting, or on fatigue it is slung at the left hip by a band passing over the right shoulder. While a man sleeps he may adjust the band in any way for comfort, but he must not remove the mask! A hideous death almost certainly awaits the one who disregards this regulation.

The last two miles, including the first lines of trenches, are known as the "alert zone." In this fume-drenched strip it is not enough even that the masks are at hand for immediate use, for often no warning is given. On every road and communicating trench leading forward a watcher is stationed whose sole business it is to see that every soldier, entering the zone forward, has his mask at the position of "alert."

This means that the "tin cans"—as our boys know them—are removed from the carry position and the holding band shortened. This brings the mask immediately over the soldier's breastbone. Then the strap and buckle are removed, and the flap covering of the mask allowed to drop. The protector itself still remains folded to keep moisture from the chemicals, but it is presumed that the total time necessary in donning the mask from this position should never exceed two seconds.

Concerning the construction of the American mask itself, little can be said at present. It possesses goggles to guard the eyes, a mouthpiece by which it is held in place, and the tin can, fitting over the nose through which the breath is drawn. The can is corrugated for the sake of strength. Very few people in the United States know exactly the contents of the mask—and these, very naturally, are not talking for publication. The army authorities guaran-

tee, however, that the various layers of fabric and chemicals within the can will either filter out or neutralize almost all the poison gases that are known to science.

There exist three main divisions of poison gases used by the German army. These are:

I. Tear Gases:
  A. Formaldehyde.
  B. Mustard gas.
II. Lung Gases:
  A. Phosgene.
  B. Chlorine.
  C. Mustard gas (acts also as tear gas).
III. Paralyzing Gases:
  A. Phosphine.
  B. Arsine.
  C. Cyanogen.
  D. Carbon disulphide.

Besides these really poisonous gases there are several which have been used for certain special purposes apart from direct slaughter. Of these, carbon dioxide is one, and its use will be mentioned later.

Concerning several of these gases it is not necessary to dwell at length. The tear gases, formaldehyde in particular, are well known to the American public. Formaldehyde comes generally in a solution known as formalin for commercial use. This liquid is employed for pickling cadavers for dissection in medical schools, for fumigation in hospitals and private homes, and for general antisepsis where a terrifically strong agent is wanted. Formaldehyde fumes arise from even the weakest solutions, and these attack all the mucous membranes of the body. The nose aches, the throat becomes raw and terribly sore, and the eyes, bloodshot and watering profusely from the irritation, are put out of commission for hours or days. There is no difficulty in detecting formaldehyde; the choking sting of the fumes is unmistakable.

Mustard gas, an acid agent, acts also on the eyes. Taken in a diluted atmosphere, a little at a time, it causes the eyes to protrude in alarming fashion until—in the rough parlance of the trenches—"you could hang your hat on 'em!" Blindness, either for a few weeks or forever, ensues after sufficient exposure. This devilish agent is exceedingly popular with the Huns mainly because it does not kill unless inhaled in large quantity. Fritz figures one totally disabled opponent worth more even than two dead enemies because he is a burden that must be carried.

As a lung gas, though, this agent is even more sinister. It possesses a mild, slightly agreeable odor, likened often to the far-away incense of skillet cooking in which there is the slightest hint of garlic. The ordinary impulse, after weeks of bully beef and sugarless coffee, is to sniff it hungrily, and follow it down to its source. The ordinary soldier would not fear it in the least, because he naturally would enjoy the odor. Providing the gas fumes were thick he could keep on enjoying it for perhaps half an hour—then die in agony.

Mustard gas, like most of the fume agents now used by the Germans, comes over the lines as a liquid contained in projectiles. Immediately the shell, bomb, or what not, bursts, the released liquid drenches the ground and begins to volatilize. Mustard gas itself is particularly obnoxious because it is a sticker. Once a country has been saturated with it the terrain remains a menace until the properties of the gas are neutralized.

"A soldier cannot sit down on ground that has been drenched in this way. The gas is so acid and so irritating that it eats the seat from the trousers of his uniform. If he sits there long enough it reaches his body—and then he won't feel like sitting down anywhere for some time because of the burns."

A soldier cannot sit down on ground that has been drenched in this way. The gas is so acid and so irritating that, in addition to the effect it has on eyes and lungs, it eats the seat from the trousers of his uniform. It he sits there long enough it reaches his body—and then he won't feel like sitting down anywhere for some time because of the burns. The manner in which the allies overcome this menace is by the lavish use of chloride of lime. This alkali is sprinkled, one-quarter of an inch deep, over all the land that has been soaked with mustard gas. When this process, for some reason, is delayed, the district is placarded with signs, "Hurry on! Mustard gas!"

During the inception of the gas attack early in the war the only agent used was chlorine. This "green cloud," immortalized by the heroic last-stand defense on the banks of the Marne, still holds a place in the affections of the Huns, and is used to a small extent by the allies also.

The trump ace of the Boche poison-gas

attack now is the super-devil phosgene. This gas, first made by Davy through the process of uniting carbon monoxide and chlorine in sunlight, was used in peace times in toluene solution for dyestuff manufacture. It is colorless but unmistakable; the first infinitesimal whiff strangles and chokes the victim, and the inhalation of an amount of the gas equal to that which could be inclosed in a one-ounce glass bottle (at atmospheric pressure) is invariably and immediately fatal; no effective antidote is known. The greatest asset possessed by this fume horror is that the men who detect it usually are incapacitated for giving the general alarm; this must be done by an eyewitness who has not breathed any of the gas. It possesses all the deadliness of pure chlorine, multiplied at least by ten.

Fumes in the third class are known as "paralyzers." These act upon the nerve centers directly, causing paralysis, convulsion, coma, and death. With the exception of arsine they act very quickly. Arsine is probably the most familiar of these. Because of a lack of the raw material—metallic arsenic—from which to manufacture the gas, this implement is employed rarely by the Huns nowadays.

Cyanogen gas, the vapor of prussic acid, is perhaps the swiftest acting of all poisons known to man. Even when mixed with a moderate amount of air, an inhalation causes death to human beings in from eight to ten seconds. If a drop of the acid is held on the end of a glass rod and advanced at the rate of one centimeter a second toward the nose of a rabbit, the animal drops dead before the glass rod touches. Because prussic acid is hard to handle and costly to manufacture, and because it either kills or does not harm, it is not popular with Fritz.

Phosphureted hydrogen, or phosphine as it is commonly called, is the paralyzer used most now by the Germans. It is manufactured by the action of caustic potash and water upon phosphorus. By some new process the Germans have succeeded in producing this gas on a large scale, practically pure. The fact that it is pure does away with its greatest handicap, namely the property of bursting into flame when exposed to the air. Phosphine disables. Taken in large quantities it kills, of course, but it is by no means as deadly or as instantaneous in action as cyanogen—therefore the Germans like it. It has a nasty odor similar to that of rotting fish, which makes it easily detected, but because even enough in the air to make the fishy smell perceptible is apt to render the men breathing it *hors de combat*, Fritz uses it extensively.

Carbon disulphide is a well-known poison. It causes many deaths in the rubber industry yearly. It is a liquid which in impure form—the way it usually appears—has an unendurable stench. In addition to the central paralyzing action, this liquid—which volatilizes readily on exposure to the air—causes hæmolysis or a breaking up of the red blood corpuscles in the blood. This causes cyanosis, vertigo, weakness, coma, and death.

As previously mentioned, many occasions occur in modern warfare that call for the use of a gas that is not, in itself, really a poison. A classic example of this occurred during the first two weeks of the big German drive. The first hint received on this side of the water lay in Haig's statement, published on April 3, 1918. "From now on the tanks will be used less and less. . . ." he said.

Why? We had thought the monsters of the Ancre a tremendous success. It was even reported that the Germans had promised their troops better and bigger tanks with which to combat these stodgy Titans of the mud. The German tanks did not appear at that time, but we thought this merely an example of a German failure; that they had encountered insurmountable difficulties in the manufacture.

This was not the truth, however, much as we would like to believe it. The real reason back of Haig's statement and back of the failure of the Hun tanks to appear was the simple fact that the Germans had discovered a method of making British tanks worse than useless!

The answer was absurdly simple. Since a tank is nothing but an armored turtle squatting on a huge gasoline-truck chassis, anything which stops the motor stops the tank. No carburetor yet manufactured can deliver an explosive mixture to the cylinders of an engine when the air intake sucks in a large volume of carbon-dioxide gas. The best engine simply dies!

German engineers found this out just before the capture of Bapaume. Therefore, when the engine-driven forts slithered out through the mud to meet the oncoming Boche wedges, German batteries simply dropped scores of tons of carbon-dioxide projectiles in their immediate vicinity. The engines stopped and the tanks were helpless. "H. E." shells sought out many and destroyed them, and the crews of the others, seeing further resistance to be suicide, retreated to the allied trenches. At one point an even dozen of the tanks were captured in this manner, and all along the line they encountered the same fate.

It is said that allied engineers have been working on some sort of gas mask for the carburetor which will filter out the gases inimical to combustion. This sounds difficult, but with numbers of tanks again in combat, it is patent that some such attempt has succeeded.

Three other methods of gassing the enemy are being employed by the Huns today. First is the process known as "emanation." This consists in dumping the gaseous poisons in the form of salts in the low, wet portions of a territory about to be evacuated by an army. As the retreat takes place the water acts upon the salts, releasing volumes of poison gas which theo-

retically, at least, harass the enemy. Actually this method is rather ineffective, as diffusion and drying account for a great proportion of the potential strength of the salts. Besides this, the allies have certain preventive measures, similar to the chloride-of-lime treatment for mustard gas.

The second system is known as cloud gassing. This was the method used first, and is the one best known to the public. This is merely the release of huge volumes of chlorine, phosphine, or arsine along a line of trenches when the wind is favorable. The latter waits the heavy clouds slowly into the lines of the enemy. Because means of defense against this have improved so appreciably, it is certain that the system is doomed to the discard eventually.

One feature of the defense against this is interesting. The moment one of these sinister clouds appear, or is suspected, the first observer hurries to the nearest "Strombus" horn. This mechanism is the giant brother of the little growler we use in shooing deaf or heedless pedestrians away from the bumpers of our boulevard buggies. It is capable of a jagged, raucous scream that can be heard for a mile even in the din of a bombardment.

One of these horns is placed every two or three hundred yards along the trenches, and at spaced intervals for the whole of the three gas-mask zones back to the limit of the prepared zone. The rule in regard to Strombus is that the moment one starts, every other Strombus takes up the shrieking alarm. By this means, notice of a cloud-gas attack has been carried along a front of 25 miles and to a depth of 20 miles in 12 minutes. Telegraphic zones are established so that a commander, in receipt of the exact data in regard to the extent of a gas attack, can limit the sounding of the Strombus to the threatened area. The horns are used for nothing whatever except cloud-gas attacks, so when the soldier hears the cry of the metallic banshee, he adjusts his mask instantly, and waits.

Emanation and cloud gassing, though, are becoming less and less popular. The most effective and, by far the most used, method of using poison fumes today is through the medium of projectiles. These mainly are huge shells, though in some cases where the trenches are close together gas bombs and "minnies"—projectiles from minenwerfer—play their parts. This is taking into consideration, of course, only a bombardment. In an actual attack the hand gas bombs and the gas grenades fired from pistol and rifle are really of considerable importance.

These shells do not carry any considerable charge of explosive. When they go off they make a very slight noise similar to a "dud"—a shell whose detonating cap explodes without firing the main charge. For this reason it is not difficult to distinguish gas shells coming in large quantities. Though in

"The real reason back of Haig's statement and back of the failure of the Hun tanks to appear was the simple fact that the Germans had discovered a method of making British tanks worse than useless!"

some sectors and on some occasions the proportion of gas to "H. E." shells used has been as high as four to one, the correct proportion for the greatest amount of gas damage is exactly the reverse. One gas shell in five will pass unnoticed in drum fire, and therefore will have the best chance of wreaking its havoc unsuspected.

In occasional shelling, it is easy to detect the gas projectiles passing overhead. While the "whiz-bang," "smoke-pot," and "pip-squeak"—so named because of their auditory or visible characteristics—can be seen going by as clean and straight as detached arrow heads, and making their respective noises, the gas shell tumbles end over end like a drop-kicked football. This is because the liquid contents cause forward rotation.

The means used for spreading the alarm for gas bombardment are many and varied. The Strombus horns, reserved for cloud attacks, of course are not used. Huge metal triangles, similar to the instruments used by bands and orchestras, only many times larger, are struck by sledge hammers, bells are rung, and at night peculiar flare rockets are sent up. The main point is that none of the warning signals are wind-operated. For this there is an obvious and very simple reason.

"Beside the inner door two soldiers are always stationed. These carry large fans; when the first door opens and closes, admitting a soldier, or stretcher bearers, the fan wielders throw open the second door to admit the newcomers, meanwhile fanning back the little poison gas that may have filtered in the entry way."

Because human beings cannot wear gas masks for more than three hours at a stretch without some relief, every supporting trench and reserve trench now possesses gas-proof dugouts. In a few places these are still to be found in the fire trenches, but because late practice has been to defend the latter very thinly, the deep dugouts usually are situated farther back.

The method by which a 35-ft. dugout—this is the deepest now in use—is made gas-proof is a recent invention. Two "doors" are used. The first opens from the trench. Between this and the second "door" is left a space just long enough to accommodate a stretcher.

The doors differ materially from those used in office buildings or homes. The jambs are inclined backward at an angle of 60°, and no wood is used for the door itself. Instead of this a special, thick woolen blanket is employed. At the bottom edge of the blanket, when unrolled, is a heavy log or pole attached transversely. Midway to the top of the blanket door is another. Because of the slanting jambs, these weights roll down immediately the retaining straps are loosened, and hold the blanket tightly across the opening.

The jambs themselves are wrapped in heavy wool. When there is danger of a gas attack, both the blanket door and the jambs are soaked in some liquid, crude oil preferred. Where this is lacking plain water will do, although a certain amount of viscosity makes the necessity of frequent renewals less pressing.

Beside the inner door two soldiers are always stationed. These carry large fans; when the first door opens and closes, admitting a soldier, or stretcher bearers, the fan wielders throw open the second door to admit the newcomers, meanwhile fanning back the little poison gas that may have filtered in the entry way. In the shelter of dugouts protected in this manner the wounded are taken for the first dressing of wounds, the exhausted mask wearers descend for their much-needed respite, and the important phone headquarters for the front lines are located. The accommodations in all established trench sectors now are large enough so that by using his mask to the limit, the soldier can get along.

We have spoken largely of the activities of the Germans in regard to poison gas. This is because of the two facts that in the beginning the Germans were responsible for the use of this terrible weapon; it is a positive certainty that had they never launched those attacks with chlorine, the allies would never have deserted the tenets of their civilization to the extent of employing gas. Chivalry in warfare cannot be one-sided, however, when the combat is to the death, and so the allies have been

forced to yield reluctantly to the use of gas. In the main they have simply adopted the weapons forced upon them by the Huns, and for this reason their attacks have not had the same success as the cool, calculated fiendishness of the Hun.

For tactical reasons much of their present activity cannot be featured in the magazines, for such publication would only aid the Germans. As a good example of one occasion on which they gave Fritz something to think about, may be cited the historic incident which delayed the beginning of the present drive until late in March.

The allies made use of a gas which we will call chloropicrin. This is the name actually used by our soldiers, but it is not chemically descriptive; we don't care to tell Fritz all about it yet. This gas, used in shells and other projectiles, now is one of the most hated weapons employed on the western front. The inhalation of even a minute quantity causes violent nausea, similar to seasickness, but more severe and protracted than the worst maritime case of stomachic insubordination. The victim wants to die, no matter how little he inhales—and if he sniffs enough of it his wish is gratified.

As has been said previously, the gas phosgene is a most deadly weapon. One small inhalation kills. By combining the use of chloropicrin with phosgene, and taking advantage of a fatal weakness of the German mask—that one covering is used for both mouth and nose—the scheme succeeded.

First came an intensive bombardment with chloropicrin projectiles. The effect of this on the Germans can be well imagined. The new gas penetrated the masks, causing nausea worse than the choppy North Sea at its nastiest. Off came Fritz's masks, naturally. Vomiting and retching was the order of the day. After 10 or 15 minutes of the bombardment, however, the nature of it changed suddenly! Phosgene shells descended by the hundreds of tons! This deadly gas caught Fritz unprepared—and probably too sick to care. Tens of thousands of Germans either died or were badly disabled, and all without a single allied casualty!

Not in all of the occasions in which the allies have matched wits with Fritz have they come off as well as this, but we in America may rest assured, from now on, that not only are the finest preventive measures given to our boys to help them live through the German gas attacks, but that Fritz is getting as good or better than he sends.

THE NEW PRESIDENT WILSON BRIDGE AT LYON

This Is the Splendid New Bridge Spanning the Rhone River at Lyon, France, Which was Named, on July 14, for President Wilson. It Stands as a Monument to the Growing Friendship Which Unites Two Sister Republics on Opposite Sides of the Atlantic in a Great Common Cause

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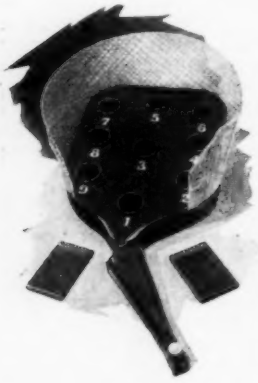
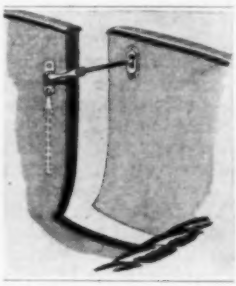
NEW PARLOR GAME PLAYED LIKE NINE-HOLE GOLF

A new parlor game, which is patterned after golf, is played with a small ball fired by a spring onto a nine-hole board, or "course," measuring 16 by 13 in., and surrounded on three sides by netting. The game calls for a degree of skill in discharging the ball so that it will fall in the hole aimed at. Whether it reaches its goal or not, the ball automatically rolls back down an inclined board and into position in the discharge mechanism. The person driving the ball into the nine holes with the least number of shots wins the game. A score board is provided to keep track of the number of shots.



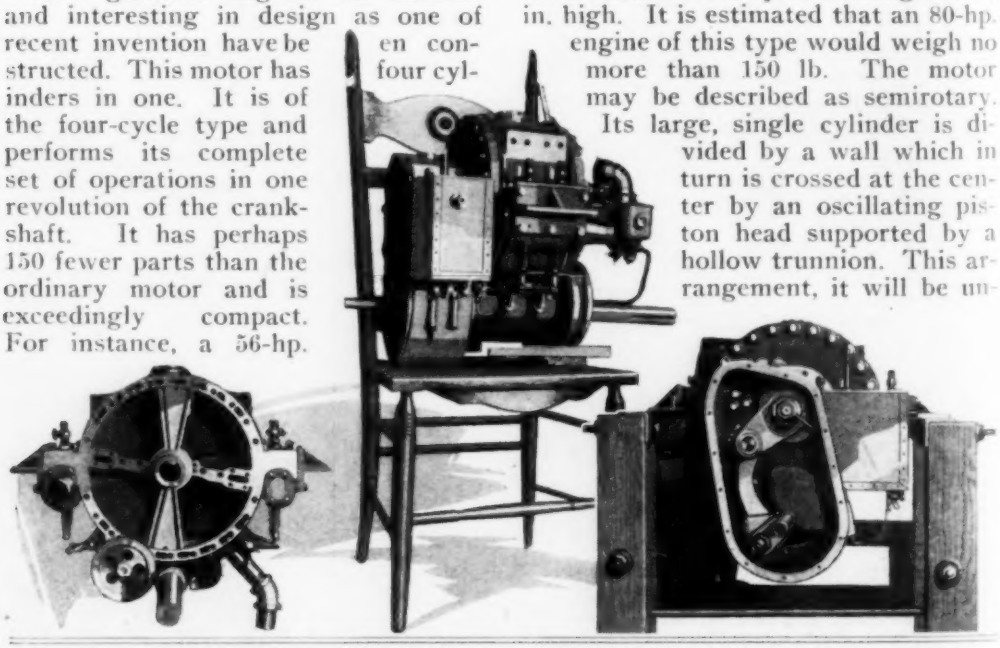
VENTILATING ROD AN AID IN KEEPING CAR COOL

A jointed rod attached to the inside of an automobile body near the fore door is an accessory now used to hold the door ajar, thereby permitting better circulation of air in the car. When not in use the end of the rod, which fits in a socket in the door, is removed, permitting the arm to drop into a vertical position.



NEW GAS ENGINE HAS FOUR CYLINDERS IN ONE

Few gasoline engines so unusual and interesting in design as one of recent invention have been constructed. This motor has four cylinders in one. It is of the four-cycle type and performs its complete set of operations in one revolution of the crankshaft. It has perhaps 150 fewer parts than the ordinary motor and is exceedingly compact. For instance, a 56-hp. model measures only 18 in. long and 18 in. high. It is estimated that an 80-hp. engine of this type would weigh no more than 150 lb. The motor may be described as semirotary. Its large, single cylinder is divided by a wall which in turn is crossed at the center by an oscillating piston head supported by a hollow trunnion. This arrangement, it will be un-



Left: Head Removed, Showing Interior of Cylinder; the Upright Member Is the Rocking Piston Head. Size of 56-Horsepower Model is Indicated by Middle Picture. Right: Illustrating Connecting Rod and Counterbalanced Crankshaft

Preparing for Down-Town Truck Gardens in Detroit: A Tractor Plowing Up a Fine Stretch of Lawn in Library Park in Order That the Ground may be Used for Raising Vegetables

derstood, divides the cylinder into four separate chambers. These in turn correspond to the four cylinders of a conventional engine. Firing occurs in 1, 2, 3, 4 order. As an explosion takes place in one compartment, the rocking piston head simultaneously compresses gas in the next chamber, fuel is drawn into the third one, and the fourth space exhausts.

The oscillation motion is changed to rotary motion by the connecting rod which turns the counterbalanced crankshaft. Leakage is prevented by spring-held packing strips that fit in grooves in the sides and ends of the piston head, and by packing rings that encircle the trunnion. Fuel is superheated as it passes through the latter member, the cubic capacity of which corresponds to the piston displacement, which for the size and weight of the motor is very large. The engine is rated as having a 5⅛-in. bore and a 5-in. stroke. Cheapness of construction, economy of fuel, and simplicity of design are among the advantages claimed for it. In addition there is the important feature of the cushion effect that results by virtue of the piston head finishing its strokes against compressed gas. This has the effect of reducing vibration, which is an important consideration, since thereby the life of the motor is lengthened.

DETROIT PARK PLOWED UP TO RAISE VEGETABLES

The city of Detroit officially demonstrated its interest in food raising this year by plowing up Library Park, one of its down-town recreation centers, and using the land for truck gardening. When the sod, which had long been the pride of caretakers, was turned over with a steam tractor, hundreds of persons lined the edge of the area to witness the novel sight. It is better to pay men to raise food than to mow grass, said the authorities on deciding to utilize the greensward.

WRITE IT "FRANCOAMERICAN" SAYS FRENCH WRITER

In writing of operations in which French and American troops have cooperated, a Paris journalist at the front uses the term "Francoamerican." The deletion of the hyphen he explains by declaring there has been transfusion of blood and effusion of hearts between poilu and Yankee on the field of honor. This compliment, characteristically French in its graciousness, shows that the spirit of France and that of America are gradually blending into a new spirit of international union that binds the two republics together, more closely than ever.

DRAWING TABLE AND STOOL FOR SCHOOL USE

A drawing table that has proven particularly satisfactory for school use, is provided with a maple top tilted at an angle of 10°, supported by two 1-in. steel uprights, rising from circular, wide-spreading metal bases. Connecting the legs is a horizontal bar that serves as a foot rest, while attached by a bracket to one of the uprights is a movable tool tray. One advantage of this table over those of the cabinet type is that it permits the user to sit closer to his work. Accompanying the table is a circular stool with a support similar in design to the table legs and provided with a foot rest projecting from the top of its base.

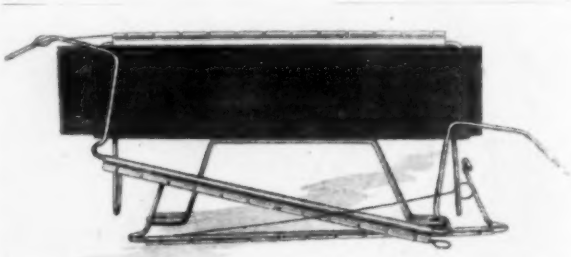
Drawing Table and Stool of Simple, Durable Construction, Especially Suited for School Use: The Table Stands 36 Inches High at the Center and Enables the User to Sit Close to His Work

ARM BAND WITH GOLD STAR TO HONOR SOLDIER DEAD

A special arm band, to be worn by persons who have lost near relatives in the war, has been devised by the woman's committee of the Council of National Defense and has received the approval of the president. It consists of a band of black broadcloth, or other suitable material, 3 in. wide, to which is fastened a gold star for each person for whom the wearer mourns. What is known as the gold star of the navy, $^{15}/_{16}$ in. in size, is the star recommended. Such stars can be bought at military equipment stores.

HANDY HOLDERS FOR USE IN DEVELOPING FILMS

Special film holders are a new timesaving accessory for the photographer who develops films that are put up in flat packages instead of rolls. Accompanying the holders is a wooden standard that fastens to a table and has recesses at either end, in which the holders are placed while being filled. The holder consists of a long hollow bar, with hooked ends, in one side of which are 12 notches. Into each of the latter the edge of a film is inserted and then held in place by forcing a slender pin through the hole in the bar. If desired, several racks can be hung one below the other before being lowered into the developing tank, for which purpose the ends of the bar are shaped into hooks.



Metal Film Holders and a Standard with One of the Holders in Place, Ready to be Filled: One Single-Exposure Film is Placed in Each Notch, All being Held in Place by a Slender Pin

Copper in the Arctic

by William Thompson

View on the Coppermine River, Canada, Which Crosses the Arctic Circle and Empties into Coronation Gulf: Along This Stream the Blond Eskimos Obtain the Copper for Many Crude Implements

TRADITION has pointed her finger to rich deposits of mineral in the "Barren Lands" of the northern wastes of our continent whose shores are laved by the Arctic seas. There have been but few to touch this mystic land of solitude—Hearne, Stefansson, W. V. Bruce of the Canadian-Arctic Expedition, Rae, Richardson, and Anderson, also of the Canadian-Arctic Expedition, have brought back to civilization utensils and implements made from virgin copper, untouched by the smelter's craft, and made into grotesque shapes by a hammer of stone. Snow knives, ice picks, spearheads, arrow points, fishhooks, needles, and other articles for Eskimo activities are made by the Copper Eskimo, known also as "Stefansson's Blond," and bear testimony to copper deposits as yet not definitely located.

An Eskimo That Knows the Copper-Mine Country Well: His Name is Kocha, and He Is a Friend of Stefansson, the Explorer

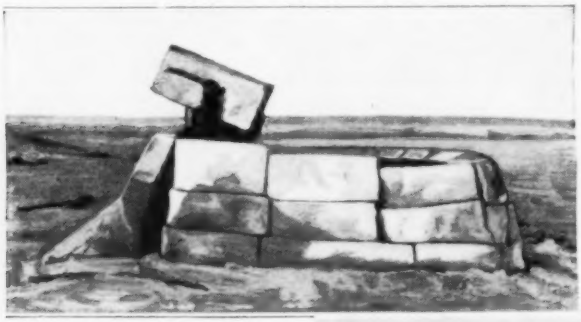
Samuel Hearne, as pioneer for the Hudson's Bay Company, made an expedition in 1771 to the copper-mine country with a hope of locating the deposits which were said to exist. These rumors were brought by the Indians of the Great Bear Lake district who said that the copper deposits existed in the land of a strange and unknown people far to the east.

It was on this expedition that Hearne's Indian companions murdered about 50 Copper Eskimos at a place now called Bloody Falls, a short distance from Coronation Gulf in the Arctic, south of Victoria Land.

Trappers in the vicinity of Dease Bay, Great Bear Lake, report that the Bear Indians, roaming the country east of Great Bear Lake, have in their possession many examples of copper implements which they received in trade from the Eskimos who came, they say, from a country a great dis-

tance away, to the east. The white explorers and trappers have in vain tried to get a definite idea of the location of the source from which the natives get the mineral.

The Indians say the copper is washed by the rain from the banks of a long river. To the east and not far from Baker Lake, en route from the Coppermine to Chesterfield Inlet, Hudson Bay Indians report vast deposits of copper and lead, the latter being smelted with moss.



An Eskimo at the Mouth of the Mackenzie River, Building a Snow House: The Knife in His Upraised Hand Is Made of Copper, by Primitive Methods

The Sled Used by These Eskimos is Riveted with Copper Rivets Made by the Natives, Which Shows How Accessible This Metal must Be in This Far-North Country

Blond Eskimo Fisherman and His Wife, Each Holding a Spear Made of a Willow Shaft Tipped with a Head of Virgin Copper

The northern Indians of Churchill River, before the Hudson's Bay Company established a settlement, had only implements of copper. There is no doubt that unlimited deposits of that metal exist, as a tale is told of an old woman who was a great conjurer and was the first to discover the mineral that lay in heaps on the surface of the ground. She would lead the Indians to the place where they could pick, from a great variety of shapes, the pieces best suited to the article they wished to make.

They did not treat the old lady with the respect due to her years, so she refused to guide them ever again, vowing she would sit on the copper until it sank to the bowels of the earth, and she with it. Travelers found her the next year buried to her waist, and on the following year's journey they found that she had disappeared, and with her the precious metal.

Sir Alexander Mackenzie said one band of Indians believed their forefathers came to our continent by the Coppermine River. They found the land strewn with copper over which dirt has now collected to the depth of six feet.

The distance from Chicago to the Coppermine River is about one-half that from Chicago to Petrograd. To those who have the spirit of adventure, the time and the means, this virgin empire, which has hardly been touched by the foot of the white man, offers gifts of furs, petroleum, asphalt, lead, copper, gold, and silver, and may be reached by Edmonton, Alberta, via the Canadian Pacific Railway to Peace River Crossing; thence by the Peace, Slave, and Mackenzie rivers to Fort Norman; up the Great Bear River, across the Great Bear Lake, thence via the Dease River to the Dismal Lakes and Coppermine River. At Dismal Lakes in the summer season

A Representative Group of Coppermine Eskimos: These People Use Implements Almost All of Which are Made from Copper Found in a Region in Which the White Men have of Late Developed the Keenest Interest

the voyageur may meet the Blond Eskimo, the most primitive of all the peoples of the earth. Some day the Canadian government may build an iron way to these lands of silence, where, no doubt, will be found riches as great as the once undreamed-of wealth of Alaska.

¶After several years of consideration, the American Association for the Blind has adopted what is known as the "revised Braille" as a standard type of printing for the sightless. The New York point and the American Braille, in use in this country, will be gradually discarded.

The Blond Eskimo on the Right Holds in His Hand a Snow Pick and the One on the Left a Snow Knife, Both Implements Made from Slabs of Copper 12 Inches Long and Beaten into Shape with Stone Hammers

This Photograph, Taken South of Victoria Land, Shows a Blond Eskimo in the Act of Striking at a Fish with a Spear Having a Three-Prong Head, Made of Copper. The Shallow Waters at This Point Afford an Excellent Opportunity for the Use of This Implement

CAMP LIBRARY DISPLAYS BOOKS IN WINDOW

In a window next to the entrance of a large cantonment library, the librarian has arranged a set of shelves on which have been placed a varied selection of attractive books, the titles of which passing soldiers can easily scan without entering the building. This simple arrangement has done much to stimulate the habit of reading among the men.

Entrance to a Cantonment Library, Showing the Window Filled with Books to Attract the Attention of the Passing Soldier

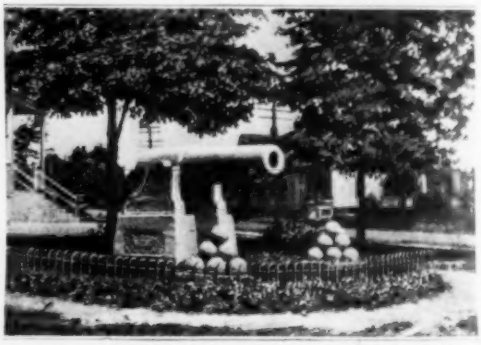
MAKE COTTONLIKE PRODUCT FROM WOOD FOR WOUNDS

Wood is now being converted by a new process into a substitute for absorbent cotton—a product which is being supplied to the government by one mill at the rate of several tons per day. This absorbent wood is of great value in covering and stanching open wounds. The wood is ground up and then spun or rolled out into pure-white sheets resembling cotton batting, and is so light and bulky that only about 4,000 pounds of it can be packed in an ordinary box car. This substance costs 28 cents a pound, as against approximately 80 cents a pound for cotton lint.

A Sample of the New Substitute for Absorbent Cotton Made from Wood: It Has a Soft, Fine Texture and the Fibers Pull Apart Easily

ORNAMENTAL CANNON OF CONCRETE

A cannon of the type in use many years ago has been built of concrete and erected on a prominent site in an eastern village. It rests on a carriage of the same material, while in front of it are two piles of cannon balls. The monument represents painstaking work on the part of the builder who has reproduced various details of a real cannon with great care.

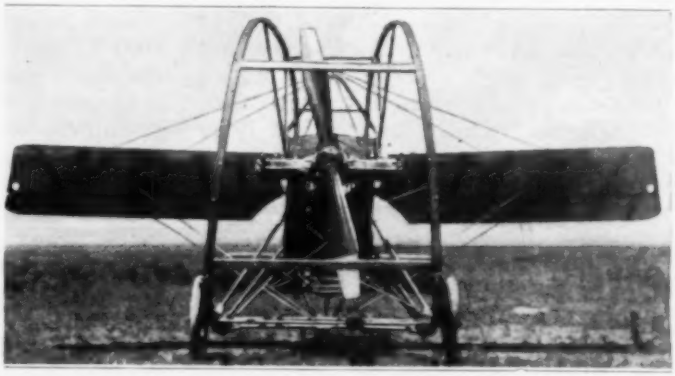


Cannon and Carriage of Concrete: A Patriotic Monument Erected in Front of the Public School in an Eastern Village

¶As a means of solving the domestic-servant problem and providing work after the war for women munition makers, which will not be objectionable to them, it has been proposed in England to organize a "household orderly corps," the members of which will be trained for domestic service and will be supplied to housewives from district centers.

FRONT GUARDS ARE PLACED ON TRAINING PLANES

Flightless Penguin planes used at one of our aviation fields are being fitted with guards that protect the propellers against accidental breakage. The machines are those used by novices before being trusted aloft. They skim and flip across the ground somewhat like grasshoppers and accustom their pilots to plane motion. Often, because of the condition of the field, one of the craft tipped, tail up, so that its propeller struck the turf and instantly snapped. To obviate this source of continual trouble and material expense, the protecting hoop guards, extending from the landing gear to a point behind the pilot's seat, have been installed. In service they are proving effective in minimizing mishaps of this nature.



One of the Penguin Training Planes at a Flying Field, Fitted with Guards That Protect the Propeller against Damage, should the Machine Upend or Bump against Some Obstacle

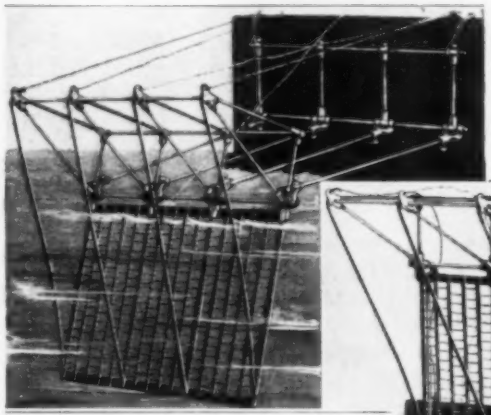
SAFE-DEPOSIT FACILITIES IN POST OFFICES

The post-office department of New Zealand has gone into the safe-deposit business, arrangements having been made in the principal post offices for the safe-keeping of sealed packages, not over 11 in. long, containing valuable papers, such as wills, bonds, and insurance policies. The charge varies from approximately $1.25 to $5 per year, according to the size of the package. That the service may be available to all, packages may be forwarded to the offices having safe-deposit facilities, from any mail-order office in charge of a permanent official.

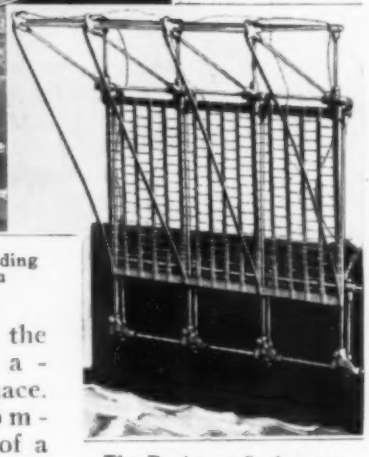
¶Authorities in New South Wales report the discovery of platinum in that colony as a placer deposit in alluvia.

MOVABLE FENDER PROTECTS BOAT FROM TORPEDOES

A fender, which in an instant can be dropped into position by a ship's side to ward off an approaching torpedo, is one of the newest devices designed to check the submarine menace. It is composed of a substan-



Model of a New Device for Warding Off Torpedoes, Here Shown in Lowered Position

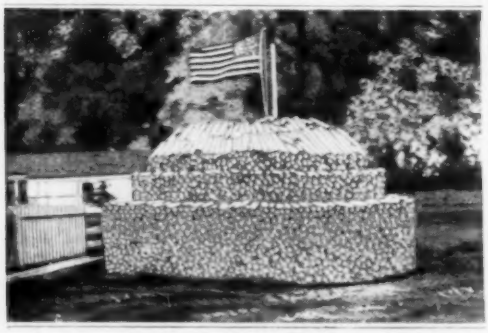


The Device as It Appears When Raised

tial metal framework across which are stretched intersecting wires and bars, placed at frequent intervals. The fenders are intended to be built in units 50 ft. long and would be placed to guard vital parts of the ship. When not in use they are folded up against the side of the hull, while in time of danger they can be dropped into position merely by severing the rope which holds them. Lowered for protection, they hang vertically several feet from the side of the boat.

"OLD GLORY" STILL FLIES OVER WOODPILE FORT

When an American citizen in Skagway, Alaska, hoisted a flag above his next winter's supply of wood, which



Woodpile Fort in Skagway, Alaska, above Which the Owner Obtained Permission from a Circuit-Court Judge, to Fly the American Flag

he had piled in the form of a fort, local authorities were of the opinion that disrespect had been shown our national emblem, and ordered it taken down. Appeal was then made to the judge of the circuit court of the region. From him permission was obtained to fly the flag above the store of fuel, the judge holding that such a location constituted no act of disrespect to the Stars and Stripes.

¶Because used books and periodicals offer a convenient means of secret communication, the War Department has ruled that books and periodicals can be sent to American prisoners of war in Germany only when ordered through the publishers and dispatched from the offices of the publishers.

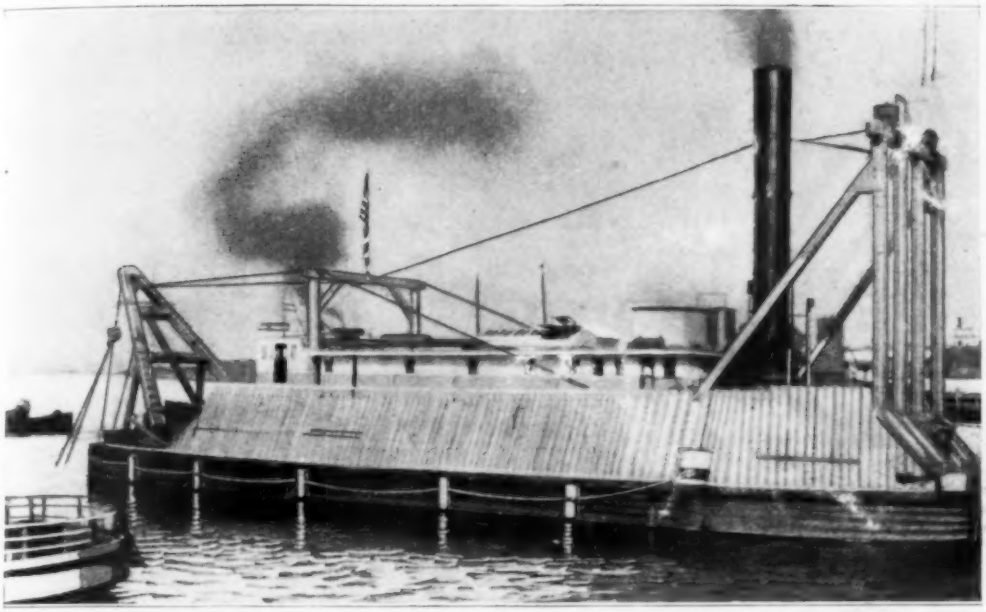
NEW BRASS SUBSTITUTE USED IN MANY WAYS

The high price of brass which prevailed in recent months was a factor in inducing a concern to bring out a substitute for sheet brass known as ribbon zinc which is now being utilized in making a variety of articles, including parts for lighting fixtures, ornamental articles of metal, etc. For example, it is spun into rings, 8 in., or more, in diameter, used in supporting bowls or urns. Another type of ring spun from this material is that used in fastening light globes close to the ceiling. In the manufacture of hand-made hall lamps, the various parts of the article are made separately and then soldered together. The material takes a heavy copper plate, and can then be given any oxidized finish that may be desired.

PLACARD PUTS BAN ON USE OF FOREIGN LANGUAGES

The aversion felt by many patriotic persons in this country toward the use of foreign languages, particularly German, has prompted the issuing of a placard which is being prominently displayed in offices, shops, etc. The wording leaves no doubt as to its meaning. It reads: "Foreign Born Citizens and All Others are Requested to Talk American if They want to be Loyal to the U. S. A."

Placard Designed to Promote the Use of, and Greater Familiarity with, the Language of Our Country



With Heavy Planking Protecting It from being Swamped at Sea, This Dredge was Towed 6,000 Miles from the Pacific Coast, by Way of the Panama Canal, to Florida without Mishap

TEMPORARY BULKHEADS FIT DREDGE FOR OCEAN VOYAGE

Before being started on a 6,000-mile voyage from the Pacific to the Atlantic coast via the Panama Canal, a large floating dredge was fortified for an encounter with heavy seas. Heavy planking was used to build up the sides of the barge so that waves would not break over its deck and swamp it. In charge of a tug, the dredge was towed to Cuba and then to the Florida coast without incident.

METAL FLOATS A FEATURE OF NEW LIFE BELT

A new life belt which has been introduced at a large ocean resort, consists of a broad strip of canvas which fastens securely about the waist and to which sealed metal floats are attached. These air-filled units are placed at the back and front so as not to interfere with the movement of the wearer's arms. Besides being used as a life-saving device, the belts afford bathers much pleasure in riding the breakers. Unlike some belts containing buoyant filling, these are in no danger of being waterlogged from long continued use. They are also very light.

The Bather on the Right is Holding Up One of the New Life Belts Showing the Metal Floats Inclosed in Canvas Envelopes. She is Wearing a Belt of Slightly Different Design

INCALCULABLE QUANTITIES OF PITCH

A General View of the Lake from an Incline up Which the Loaded Dump Cars are Drawn: The Deposit Is About Three Miles in Circumference and Covers More Than 100 Acres. The Asphalt Is of Unknown Depth, and the Surface for the Most Part Is Hard Enough to Walk On, While the Mass, near the Top at Least, is Permeated with Air Holes Like Cheese. The White Patches Are Pools of Water That Collect between the Mushroomlike Mounds of the Surface

Three of the Narrow Rail Lines on Which the Asphalt is Removed: The Intense Heat Softens the Surface of the Lake, and for This Reason It Is Necessary Frequently to Replace the Ties under the Tracks to Keep Them from Gradually Sinking Out of Sight

PHOTOS COPYRIGHT,

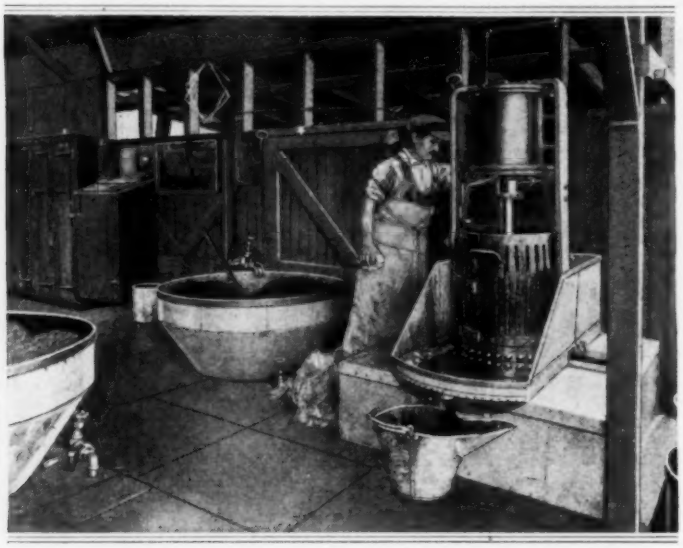
IN PITCH LAKE ON TRINIDAD ISLAND

HUNDREDS of barrels of mineral pitch, or asphalt, from one of the most remarkable and valuable natural deposits in the world and one that seems to be inexhaustible—Pitch Lake, on the Island of Trinidad, the southernmost of the British West Indies: Behind the trestle at the left can be seen some of the dump cars on which the pitch in its raw state is brought direct from the lake to the structure in the background, where it is prepared for shipment. A large part of the output goes to the United States for paving and roofing purposes. For some years a local company, engaged in working the lake, has paid a royalty on each ton exported. Near the center of the deposit the mass is in a liquid state and sometimes can be seen bubbling. One of the highways near by runs on a bed of pitch which flows almost imperceptibly toward the sea, like a glacier. The soil in the vicinity contains much asphalt and is very fertile.

A Typical Gang of Workers: The Sun's Heat Is So Intense Here That Only Blacks can Stand It. Their Usual Method Is to Dig in One Spot for a Day and Then Move On to Another Location. Within a Short Time the Surrounding Asphalt will Slowly Flow into the Excavation and Fill It

RAILWAY CLEANS WASTE AND RECOVERS OIL

Used waste is discarded no longer on the Southern Pacific Railway, for efficient apparatus for renovating the dirty fiber has been installed on its lines. The equipment includes a big steam pot and a similar boiling pot in which heat is applied to the used material to loosen up the oil. By placing the thoroughly heated fiber in a pneumatic press, resembling a cider press, a large percentage of the oil is removed, leaving the waste ready for use once more. To remove the foreign matter contained in it, the oil is placed in a tank, with water. The dirt settles to the bottom, while the pure oil, which is suitable for lubricating cars, etc., is drawn off from the surface. In view of the comparatively low cost of operating this equipment, the returns are large.



View in a Plant in Which Used Waste is Reclaimed, Showing the Steam Pot, the Boiling Pot, and the Pneumatic Press, from Which Oil is Flowing

FLOAT LUMBER DOWNSTREAM AS CHAIN OF RAFTS

A new method has been adopted by a lumber company in the Northwest of sending its lumber 20 miles downstream to the railway. Formerly large timbers were set adrift separately and the smaller ones were tied in bundles and allowed to float down, but so much lumber lodged in shallows along the way that a squad of workmen was necessary to keep it moving. The new plan is to bind the green lumber into rafts, each containing about 1,500 feet of material, and then link 30 of these rafts into a chain with planks so placed that adjacent rafts are about 6 ft. apart. Three men are assigned to such a chain or flotilla and ride it to its destination, keeping it in the current with the aid of pike poles.

Bringing the Rafts around a Bend: The Connecting Planks Permit the Floating Chain to Buckle and the Crew must Be Alert in Places Like This to Avoid Snags

Auto Snowplow Employed on a Connecticut Highway: This Road was Kept Open All Winter for Auto Trucks Carrying War Freight and for Other Vehicles

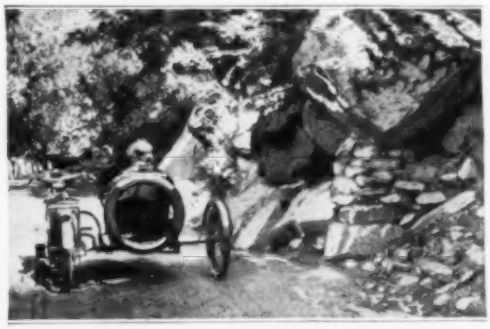
AUTO SNOWPLOWS CLEAR ROADS FOR FREIGHT

Many persons will be surprised to learn that Connecticut now has a law requiring highway commissioners to keep the roads open for traffic the year round. This progressive measure has been necessary because the railroads of the state have been unable to cope with the enormous volume of war-time freight. With the highways always open and with practically all roadbeds in excellent condition, transportation by truck has grown rapidly.

The highway commissioners faced a particularly hard job during the severe weather of last winter, but succeeded admirably. On a 75-mile stretch on the Boston post road, four trucks were employed as snowplows, each being equipped with an adjustable 10-ft. plow blade in front. After the heaviest storms one truck could clear an 18-ft. path 30 miles long. In level regions the cost was about $7.50 per mile, while in hilly districts the expense mounted to $30 and $40 per mile. In the country the trucks usually work in pairs, the second machine following the first at some distance to widen the path.

KEEP ROCKS FROM FALLING ON NATIONAL-PARK ROADS

A great amount of work has been done recently by the Department of the Interior in the national parks to prevent insecure rocks or bowlders on mountain slopes from crashing down onto roadways below. Often supports in the form of piles of flat stones have been placed under menacing rocks, while in other places anchoring chains have been used. Some bowlders have

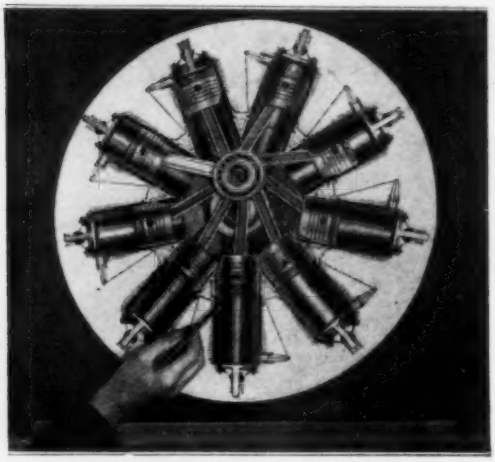


View of Road in Yosemite Park: At the Right Is a Bowlder under Which a Foundation has been Built to Prevent Its Falling into the Highway

been pried loose and rolled down to a safe level, and still others have been blasted to pieces and then hauled away.

TUTORS USE CROSS-SECTION MODEL GNOME MOTOR

At one of the Y. M. C. A. schools where young men are trained as aeronautical mechanics for the army, an



Interesting Cross-Sectional Model of a Nine-Cylinder Gnome Motor Used for Instruction Purposes at a School for Aeroplane Mechanics

interesting cross-sectional working model of a 100-hp., nine-cylinder Gnome engine is used. It is not easy to familiarize nontechnical persons with the intimate details of the internal construction and operation of a rotary motor without having a transversely bisected engine. Provision of such equipment for the school was out of the question, both because of the need of all available Gnome motors for war purposes and the fact that they cost in the neighborhood of $3,000. To offset this, a model was built. It consists of a revolving wooden disk, on the face of which are nine carefully shaped sectors, their edges forming guides for the moving pistons. The disk has an accurately machined crankshaft with a special-alloy hub and flange. This alloy is also used for the pistons, while the master and small connecting rods are made of brass. The model is rotated by a hand crank through a gear.

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FREIGHT-DELIVERY PLAN ADOPTED IN NEW YORK

What has been called the "store-door delivery plan" has been formally adopted by the Federal railroad administration for New York City, as a means of overcoming freight-terminal congestion which has almost paralyzed business in many instances. Under the new arrangement, which represents a radical departure from the established practice, all inbound freight, upon arrival, is to be trucked immediately from the railroad station or pier to the store door for delivery to the consignee. The trucking companies now in operation are to be pooled into one company, which will be under government authority. In order that the team tracks and loading places may not be congested with trucks or wagons seeking consignments that would be partial loads only, all vehicles, except those belonging to the new company, shall be excluded from the freight terminals. A drayage director will have general supervision of all piers and freight stations. He will make a schedule of rates and fix penalties for those disregarding the regulations.

RED CROSS ILLUMINATES VILLAGE STREET

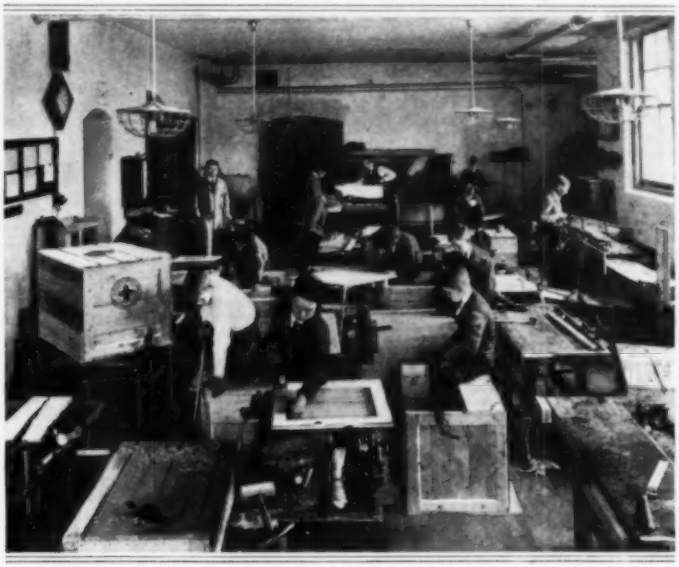
An illuminated star and a red cross were hung recently in the main street of Russell, Kan., in place of one of the arc lights, the cross serving as an effective reminder day and night of a drive that was on for the aid of sick and wounded soldiers. The two symbols together furnished ample illumination for that section of the street. It is proposed to retain the emblems in their present position until the war is over.

PLAN GREATER WHEAT CROP FOR NEXT YEAR

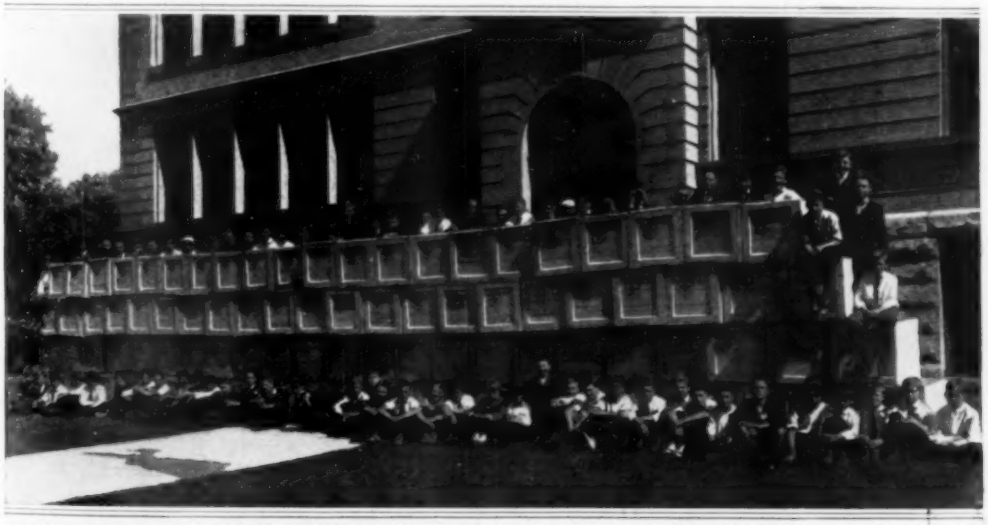
In conformity with plans of the Department of Agriculture for a wheat crop that will surpass the great yield of 1918, the farmers have been asked to sow 45,000,000 acres to wheat this fall. This represents an area approximately seven per cent greater than was sown for the current harvest. It is estimated the yield will be 636,000,000 bu. or more. Each state has been assigned its quota, and a campaign is under way to bring the sowing up to, or beyond, the mark set.

RED CROSS BOXES MADE BY SCHOOL CLASSES

The grade-school boys of Glens Falls, N. Y., have entered into their manual-training work with new enthusiasm of late because their task has been to make shipping boxes for the local chapter of the Red Cross. Within a period of six months they turned out between 150 and 200 boxes, made from lumber donated by patriotic concerns. The fact that the boys knew their work counted in a great cause, proved a real stimulus to good craftsmanship, and they took pride, on one occasion, in exhibiting their work to the public.



Sixth-Grade Boys in Glens Falls, New York, Making Red Cross Shipping Boxes in Their Manual-Training Room: In Six Months They Turned Out Over 150 of These Boxes



A Consignment of 90 Red Cross Boxes and the Manual-Training Boys Who Made Them are Here Seen Grouped in Front of a Public Building Where the Red Cross Has Its Offices

A Camp of Cree Indians on Hudson Bay: From This Tribe a Number of Recruits were Obtained for Oversea Service. The Men have Proven Excellent Fighters, But have Developed a Fondness for White Pocket Handkerchiefs, and the Like

VISIBLE-MEASURING DEVICE FOR OLD GAS STATIONS

To convert an ordinary "blind" fuel-dispensing pump into a visible-measuring filling station for motorists, a glass-bottle attachment has been devised. By employing it, a medium-priced outfit is made to fill the function of one of greater cost. Protected within a wire cage, and supported in a frame made of pipe and mounted above the pump standard, is a graduated 5-gal. bottle. Gasoline is measured and filtered in plain view of the purchaser.

¶ Judges in Tennessee have refused to punish persons accused of working on farms on Sunday, and instead commended them because of the present need of maximum food production.

INDIANS ARE RECRUITED IN WILDS OF CANADA

One of the strangest recruiting expeditions of the war took place in the wilds of Canada when an English lieutenant journeyed by rail, and then seven days by canoe, to Moose Factory, on James Bay, in the hope of enlisting the support of Cree Indians. After convincing them that he was not a conscription officer they responded in considerable numbers, insisting, however, that proper allowances be guaranteed their families while away. On arriving at the nearest railroad station, where other recruits were located, they eagerly procured such white-man conveniences as white pocket handkerchiefs, and demanded shower baths in their recreation tent. These Indian soldiers are reported to have done splendid work overseas.

BRACKEN ASH IS RICH IN POTASH

A possible source from which potash may be obtained commercially is the ash of bracken, which contains 40 to 50 per cent of soluble potassium oxide. In parts of Australia, where the weed grows abundantly, it has been found that a yield of 400 lb. of this ash can be obtained per acre. The potassium occurs chiefly as sulphate and chloride.

PUNCTURING AN ARMORED CAR

By EDWARD C. CROSSMAN

Passed by the United States Military Censor

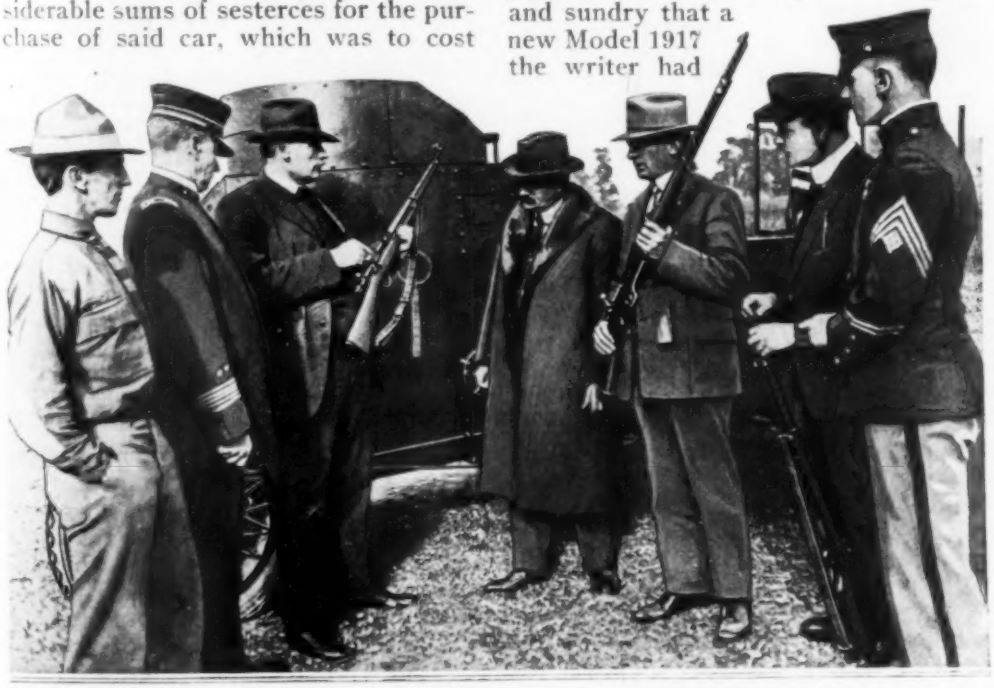
IT came to pass that on a bright, sunny winter day there foregathered at a place of shooting in Los Angeles, the "alcalde" of the fair city, the head "gendarme," a couple of dignified members of the "Holy Council of Eight," lesser dignitaries, an armored motor built on a famous chassis of eight cylinders, a movie camera, a still camera, and divers spectators, including some policemen.

Sent out as a feature of the local motor show, the car had lingered, divers patriotic citizens feeling that it ought to make the "City of the Angels" its permanent home for the awing of any persons having schemes of violence in mind. Pointed out it was by these citizens that other cities such as the largest city of Missouri had armored cars, while Los Angeles had naught but climate and a collection of good-looking policemen.

So John Goodfellow and Sam Generous, and others, had promised considerable sums of sesterces for the purchase of said car, which was to cost only the modest sum of $11,000, and it was planned to make a movie of divers weapons endeavoring to put bullets through the car, and of the resulting discomfiture of said weapons. This movie was to interest the local patriots and persuade them to use their influence, or their loose change, in the laudable endeavor to keep the gray-green steel box on wheels in the only climate on earth.

The car was built by a famous maker of armored cars in Pennsylvania and was alleged to be precisely the same in specifications as the armored cars built for the government. The steel was treated, very hard, and was $\frac{3}{16}$ in. thick in all but a certain spot a bullet discovered.

So there gathered the said galaxy of notables, with a typical policeman horning into the cast, although the part he was to play remains in doubt to the present writing. He added to the joy of the festivities by informing all and sundry that a new Model 1917 the writer had



The Chief Explains It All to the Mayor—Who Has $11,000 in His Pockets—While the Lesser Dignitaries, Including the Destructive Scribe and Marksman, Listen In and the Camera Makes a Lasting Record for Posterity

brought out was a Krag, endeavoring to force German ammunition into the Springfield, and failing to solve, while a movie camera played on him, the mystery of how to load the Springfield by means of the clip of government cartridges.

The scribe had been invited to the party by a good-looking sergeant of Marines who had charge of the exhibition, and he had been asked by the sergeant to bring over a Springfield to share in the grand laugh the car was to give all sorts of weapons assailing it. The idea of the car was of course for rioting, firing at close range, such as in a street.

So they chased the notables up to the car, and the movie camera ground out imperishable record of the chief of police showing a rifle to the mayor, and of the before-mentioned policeman trying to put the clip into the Springfield — possibly the occasion called for a Charley Chaplin— and of the mayor chalking a circle on the car, and other thrilling poses.

The Big Chief and "Hizzonor," the Mayor, Examine the Holes Made through the Supposedly Bullet-Proof Armor. The Upper Perforation was Done by a German Mauser, the Lower One by a Springfield

Then they all got back and the writer sat himself down at 25 yards for a little dress rehearsal, to see if there was any serious back splash of lead from the bullet, before they posed the mayor and the chief of police and the Marine sergeant, and others, around the writer, soaking the car with the to-be-disappointed Springfield.

The rifle bellowed and the bullet crashed into the steel of the greenish monster 25 yards away. There was no back splash of lead, but there arose a horrified yowl from the driver of the car—whom we persuaded with difficulty not to sit in the car during the trials.

"She's through!" he yelped.

Tableau!

The somewhat ruddy face of "Hizzonor" turned even redder.

The Marine sergeant turned a lovely green.

The car's boss reached out a foot in front of him and pushed his eyes back into his face.

Three disrespectful and irreverent rifle-shooting friends who had been imploring me to ring in an armor-piercer bullet on the party, seized each other by the neck and rocked in glee, thinking their nefarious whisperings had borne fruit.

But it wasn't an armor piercer, it was a plain, ordinary Springfield service bullet, taken from a bando of government ammunition.

The bullet had gone through all right. The plate was thinner at that spot than it should have been, and the steel broke away in a jagged hole.

Hastily—for the sake of the suffering sergeant—I explained that flaws in armor plate occurred in every well-regulated family, and that no doubt some other plate on the car would easily turn the bullet.

Wherefore, shooing back a depressed aggregation, I took a shot at the chalked circle on the side of the car.

A round black hole greeted the bang. Again the bullet had gone through. Also this time it had evidently gone investigating the inner workings of the car or else the car had become badly frightened—because from the forward end there trickled much water. Evidently the bullet, or the steel from the hole, had punctured some part of the circulating system of the engine, although the spot smitten was well back of engine and hood.

Feeling that I might as well advance the cause of science even more, I laid aside the service rifle and dragged out the German Mauser and its captured ammunition from the battle field of the Somme. Again there leaped the black hole in the steel, this time even neater and rounder.

After the Fearless Scribe had Tried It Out without Having His Eyes Extinguished by a Back Splash of Lead, "Hizzonor" Came Up to Boss the Job, Bringing Three Witnesses with Him

We faced the car around in a direction permitting more range, and I retired with the two rifles to 150 yards from the side of the car. The Springfield bullet shattered to gray bits on the hard steel of the car—but, alas and alack! the bullet from the Mauser rambled right through the steel once more. And the car, as remarked, was to be sold to the city for riot use, which means fighting at close range.

From the road there came the hum of a suddenly and violently started motor, then it faded away into the distance. That represented the departure of "Hizzonor," the chief of police, and other notables.

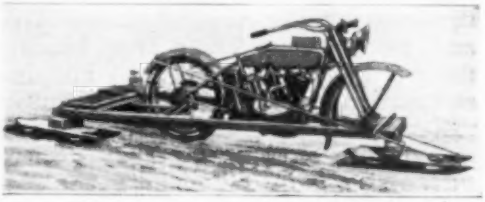
"Did you hear the jingle they made as they went away, Ed?" inquired Dick, the wag.

"No, what was it?" I asked.

"Eleven thousand dollars the mayor kept in his jeans," replied the jester.

MOTORCYCLE BOBS FOR ICY HIGHWAYS IN WINTER

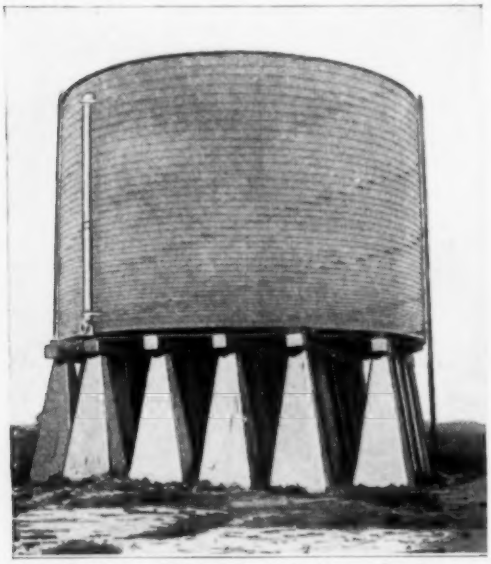
More and more motorcycle sleds appear on snow-covered roads of the North each winter. Hybrids of this sort are gaining a measure of popularity because they give cyclists a chance to use their machines with comparative safety on slippery highways.



Three Hand Sleds and a Few Pieces of Lumber Made This a Good Snow Machine. It Carried Three Persons and Was Capable of Fast Speed

WATER TANK IS SUPPORTED BY THIRTY-TWO PIERS

Thirty-two pyramidal concrete piers, 7 ft. high, serve as the support for a 70,000-gal. water tank, which has been



A 70,000-Gallon Water Tank Built on 32 Concrete Piers Which in Turn Rest on a Concrete Foundation

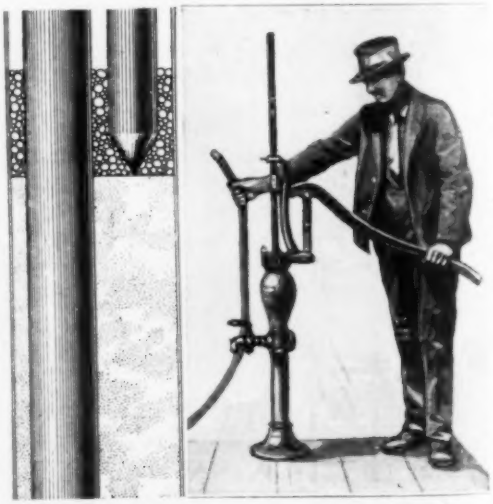
erected on the property of a large western land company. Each pier is 3 ft. square at the base and tapers to 1 ft. square at the top. All rest on a foundation of concrete, while placed across their tops are 12-in. redwood timbers.

NEW RULES TO SAFEGUARD AUTOISTS IN ILLINOIS

The authorities in Illinois have taken an important step toward making the roads in that state safe for motorists by adopting a standard type of warning signs for use on the highways. Crossings which are regarded as particularly hazardous will be marked with a black and white semicircular sign bearing the word "Stop." A recently adopted amendment to the state law requires motorists to bring their cars to a full stop before crossing a railway where such a sign is placed. These stop signals will be illuminated at night. Ordinary crossings will be designated by a black cross on a circular white field, bearing the letters "R. R.," the signs to be placed 300 ft. from the tracks.

BITTER AND SWEET WATERS FLOW FROM ONE WELL

On a ranch in Colorado there is a well from which flows bitter water and sweet, the ancient saying to the contrary notwithstanding. When the well had been drilled 72 ft., palatable soft water was struck. But because there were artesian wells in the vicinity it was decided to drill deeper. At a depth of 300 ft. water gushed to the surface which was tinctured with minerals, soda predominating, so that it was undesirable for table use. That both kinds of water might be obtained from one well, a 5-in. casing was sunk the full depth, with an opening at the point where the soft water was found. Inside the casing was placed a 2-in. pipe and a filling of cement, the latter coming within 80 ft. of the surface and topped with gravel. Into the gravel a second pipe was driven and connected to a pump, with which the soft water is drawn, while the mineral water flows from a parallel pipe.



From the Pipe at the Left Flows Mineral Water Unsuited for Table Use, While One can Draw Palatable Drinking Water with the Pump. Left: Diagram Showing the Two Pipes Which Extend to Different Levels and through Which Different Kinds of Water Flow

WRECKED PASSENGER COACH BALANCED HIGH IN AIR

A spectacular elevated-railway accident, which fortunately resulted in no serious injury to the persons involved, occurred recently in Chicago at one of the terminal stations on the elevated structure. Because of failure of the brakes to work, one of the coaches crashed into the bumper at the end of the line, tearing the forward truck from the body of the car, which slid along until over half of its length projected out over the street below. Only the fact that the car was coupled to one behind it prevented a crash to the pavement that undoubtedly would have caused serious loss of life. The accident occurred at night and the scene of the wreck took on a striking aspect, being brilliantly lighted up by an arc lamp, which stood a few feet from the elevated structure but was undamaged.

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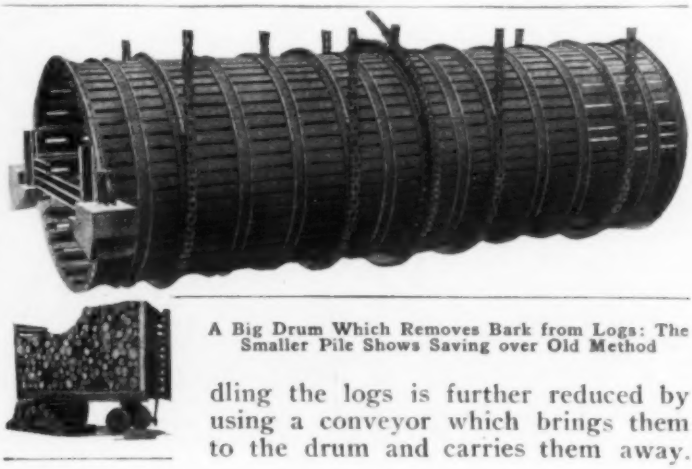
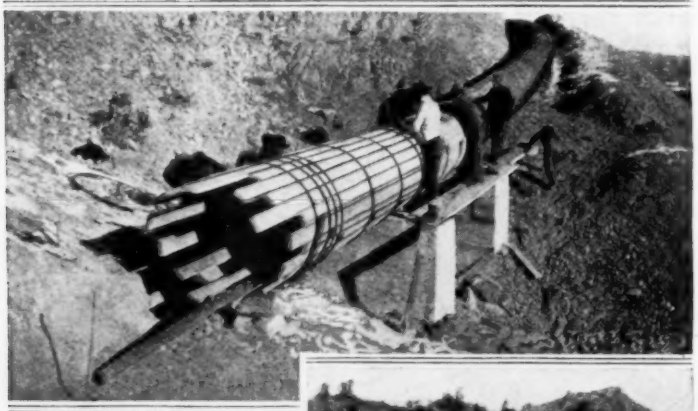
Passenger Car Precariously Balanced on the End of the Elevated Structure: The Brakes Failed to Work, It is Claimed, and the Car Crashed into the Terminal Bumper, and Then Slid beyond It, Minus Its Forward Truck

BIG STEEL DRUM REMOVES BARK FROM LOGS

A new labor-saving device employed by a pulp manufacturer is a big revolving drum in which a number of logs are placed and tumbled about until all the bark has been removed, preparatory to grinding them up for pulp. This method of handling does away with the task of removing the bark with knives. The drum is 30 ft. long and about 10 ft. in diameter, and is composed of angle-iron strips fastened inside metal hoops, one edge of each strip projecting inward and furnishing an obstruction that aids in tumbling the logs about. Not only does the drum dispense with the labor of several men, but it saves a considerable amount of wood which is wasted by removing the bark in the old way. The labor involved in handling the logs is further reduced by using a conveyor which brings them to the drum and carries them away.



A Big Drum Which Removes Bark from Logs: The Smaller Pile Shows Saving over Old Method



Close View of the Wooden Pipe, Showing How the Fir Staves are Bound Together

IRRIGATION PIPE RESEMBLES HUGE SNAKE

A splendid example of modern pipe construction for irrigation purposes is to be found in the work recently done on a large project in a Rocky Mountain state. The flue in question is 42 in. in diameter and is made of long Oregon-fir staves, sawed to a bevel and having concave and convex sides. The bands holding them together are of ½-in. round iron with threaded ends inserted in shoes. Nuts on the ends furnish means for drawing them up tight. The tubular channel starts at a diversion dam some distance from the irrigated district and winds its way through the mountains like a huge serpent, crossing deep gorges on concrete piers and ascending slopes at an angle that, in some cases, is as steep as 45 degrees.

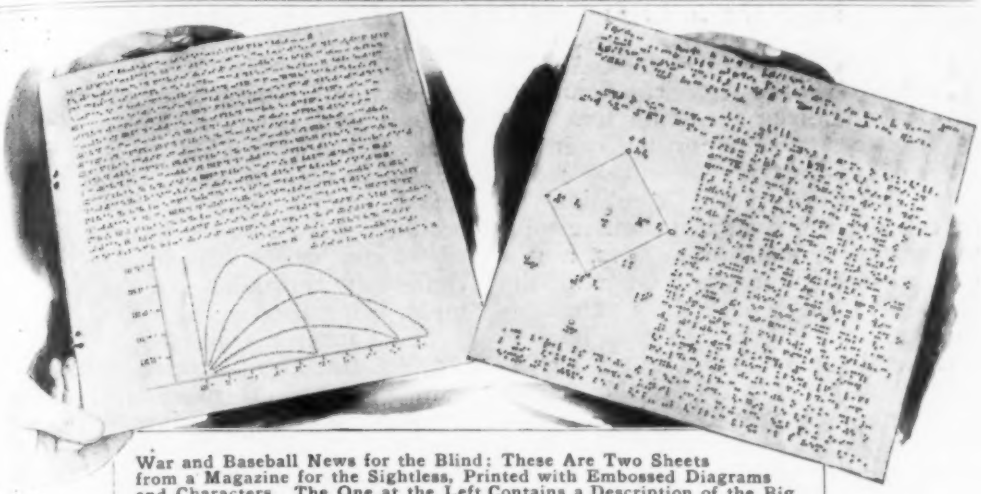
Building the Pipe up a Slope at an Angle of 45 Degrees

RAILWAY ADOPTS STANDARD TYPE OF ROUND-HOUSE

For purposes of economy as well as for greater efficiency, the management of the Pennsylvania Lines, west, has adopted a standard type of construction for its engine terminals. One contract has already been let for a new roundhouse with 30 stalls, which has been designed in conformity with the recently approved plan, and will cost in the neighborhood of $500,000. It will be a steel-frame structure with a reinforced-concrete roof and 75-ft. bridge cranes. A period of 120 working days has been calculated to suffice for its construction.

Here Is a View Showing How the Pipe Line Winds among the Mountains Like a Great Serpent, Crossing Deep Gorges on Concrete Piers

PREPARING WAR NEWS FOR THE BLIND



War and Baseball News for the Blind: These Are Two Sheets from a Magazine for the Sightless, Printed with Embossed Diagrams and Characters. The One at the Left Contains a Description of the Big Guns That Bombarded Paris and a Drawing Showing Different Trajectories of Shells. The Right-Hand Page Contains an Account of a Baseball Game and a Diagram of the Diamond

Making a War Map for the Blind: After Pasting an Ordinary Printed Map on a Sheet of Brass, This Machine is Used in Embossing the Outlines of the Countries, the Battle Fronts, and Other Details. Nine Different Characters are Employed in This Work. With the Sheet, Paper Maps can be Embossed in Any Quantity Desired

This Stereotype Machine Is Used in Embossing Plates According to the Braille or the Point System, on Sheets of Brass or Zinc Measuring Up to 14 Inches Square. The Plate is Secured in a Carriage Which Travels in an Opening in the Top of the Machine. On Each Side of the Center, in Front, Are Three Keys Which are Used in Various Combinations to Form the Letters of the Blind Alphabet. A Motor Furnishes the Power for Compression. From the Plate Any Number of Embossed Sheets can be Printed

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MINING OPPORTUNITIES IN CHINA

By F. H. WILLIAMS

FAR-SIGHTED American financiers have realized for some time that China offers great opportunities in the way of mining investments. However, there are various conditions to be coped with, such as primitive mining methods, inadequate laws, and a general indifference on the part of the natives to developing the natural resources.

General supervision of all mining industry in China is vested in the Bureau of Mining Affairs, at Peking, while each enterprise is also under the control of the commissioner of finance in the province where the mine is located. In 1917 there were 4,962 mining concessions in force, including 199 for gold, 535 for iron ore, 28 for tin, 18 for silver, 69 for copper, and so on. In addition there were a large number of mines operated quietly without government license. Concessions are easily had if the government is offered a return on the prospect.

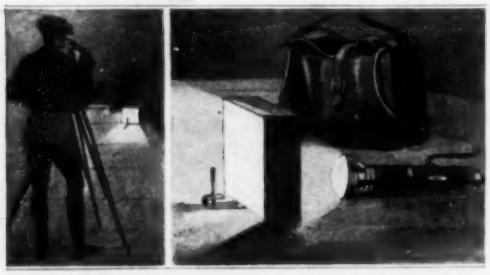
Gold is mined by primitive washing methods, such as the coolies used in California years ago. Most of the mining of this precious metal is carried on in the province of Feng-Tien. A year ago bituminous coal at the mines was bringing more per ton, despite cheap labor, than coal at the mines in the United States. Iron ranks second in importance in China and is found extensively, but with native methods it is profitable to mine it only where coal exists near by. Copper is rigorously controlled by the government, being used in currency.

China furnishes five per cent of the world's tin, the Mengtsz district in Yunnan supplying most of the country's output. The Chinese are very reluctant to introduce any new or foreign methods at these mines, where some 60,000 natives are employed.

An important consideration for prospective investors in Chinese mining properties is the character of the mining laws, which are badly in need of improvement. Today they are often stretched quite beyond their original meaning to cover cases of various sorts. The one law that appears to be adhered to strictly is to the effect that the foreign shares in any mining company are limited to 40 per cent of the total capital. China knows that it needs outside money, but wants to guard itself against foreign domination.

ILLUMINATED SIGHT HELPS SURVEYORS AT NIGHT

To facilitate surveying in busy thoroughfares, the engineering department of a western city has adopted a novel substitute for a lining pole. It is an illuminated device that enables work to be done at night when the streets are practically free from traffic. A piece of translucent cloth, or oiled paper, is pasted across the opening of a cigar box from which the top and bottom have been removed. When the frame is placed on edge it forms a screen, and in front of it a pencil, about two inches long, is supported in an upright position. The rays of an electric flash light are directed against the back side of the screen with the result that the pencil forms a dark line on which the transit can be sighted from a distance. To enable it to burn for long periods, the flash light is connected with a number of dry cells that are carried in a bag or box.



Two Views Showing Character and Use of Ingenious Nighttime Substitute for Surveyor's Lining Pole

CONSTRUCTION OF CONCRETE SHIPS IN DRY DOCKS URGED

Several plans have been advanced for the construction of concrete ships in floating dry docks. A number of distinct advantages, among them increased production, it is argued, are to be gained through the application of such a method. Permanent outer forms, movably mounted so as to provide for the release of the hull at the time of launching, and also arranged to permit various adjustments, would be employed. Such a scheme not only would enable the re-use of forms, but would materially facilitate launching, for it would overcome the danger of injury to green concrete.

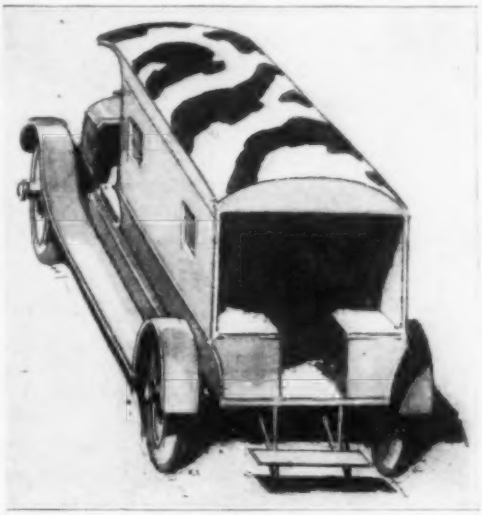
USE OF SPINNING WHEELS REVIVED IN BELGIUM

So scarce have factory-made yarns become in Belgium, due to the heavy requisitions repeatedly made by the Germans, that the oppressed inhabitants have had to bring out their old spinning wheels and with them try to provide much-needed knitting and weaving materials. New spinning attachments are being offered for sale also, and these are simple and easy to operate. For example, wheels can be obtained in Louvain which are attached to sewing machines.

Spinning Device Attached to a Sewing Machine, Typical of the Means Resorted to by the Belgians to Provide Themselves with Weaving and Knitting Materials

CAMOUFLAGED AMBULANCE ADVERTISES "DRIVE"

A striking feature of a war-time "drive" recently conducted in Chicago was an ambulance that had been elaborately decorated camouflage-fashion. Thousands of persons looking down into the city streets saw this truck with its top painted in mottled hues and at once their curiosity was aroused. If the vehicle's appearance was not strictly in accord with army regulations, it nevertheless served as an excellent advertisement for a good cause.

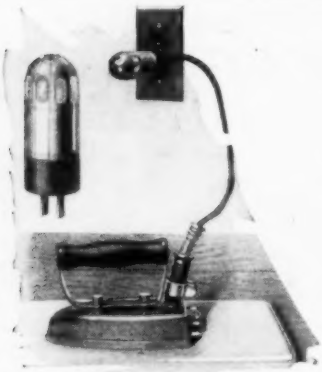


An Ambulance Used Effectively in a War-Time Campaign, Decorated Camouflage-Fashion for the Purpose of Attracting Attention

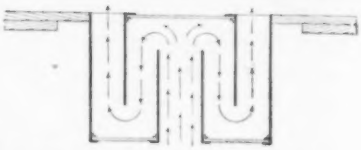
TURBINE INDUSTRY PLACED UNDER FEDERAL CONTROL

Owing to the urgent demand for turbine engines for war purposes, the War Industries Board has assumed supervision over all concerns manufacturing turbines of 700 hp. or more. There are 21 concerns affected by the new ruling and they agree to fill no order for turbines of the power stated without first receiving a permit. The only exceptions to this arrangement are the Navy and the Emergency Fleet Corporation. Permits for private or non-war use will be granted by the board only when necessary.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



The Pilot Lamp Safeguards against the Danger of Leaving a Flatiron, or Some Similar Electric Accessory, with the Erroneous Impression That the Current has been Cut Off. Price $3.50



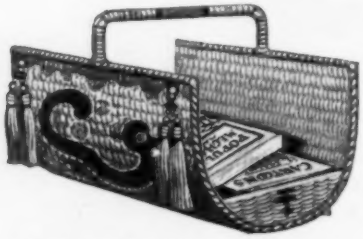
Adjustable Window Ventilator of Moderate Cost and Sightly Appearance That may be Used without Materially Affecting the Illumination of a Room during Daytime

The Center Die Being Removable, Permits This Cutter to be Used for Doughnuts, Biscuits, Cookies, and Small Cakes. Price 10 Cents

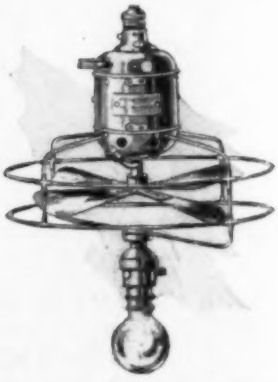
This Miniature Statue of Liberty Is a Neat-Appearing and Handy Flash Lamp for Boudoir Use. Price $3

Both for Household and Soda-Fountain Use, This Ice Crusher Is a Convenient Accessory. It Weighs as Much as a Large Flatiron and Crushes Either Small Pieces or Big Cakes of Ice with Equal Facility

Combination Broom Intended for Ordinary Sweeping and Also as a Wall, Floor, and Window Brush: It is Made of Good Fiber and Flexibly Connected with the Handle

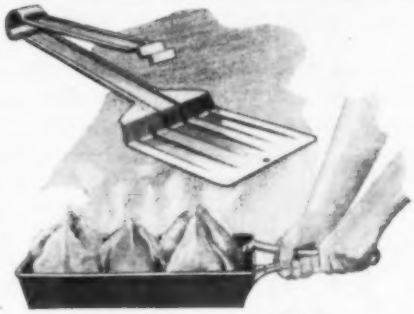


Both Utilitarian and Artistic Values are Found in This Magazine Basket, Made of Wicker and Decorated in Colors. Price $14



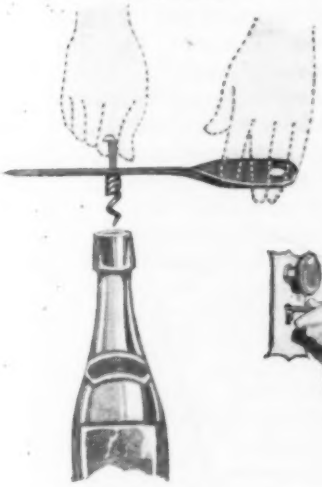
Eight-Inch Fan Equipped with a 60-Watt Lamp: Attached in the Middle of a Five-Lamp Chandelier, Its Appearance Is Both Novel and Pleasing. Price $15

A Pan Lifter, Capable of Sustaining 15 Pounds, Is Most Serviceable in a Kitchen, Particularly When Considerable Baking is Done. Price 40 Cents



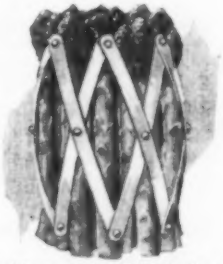
Positive-Acting Fruit-Jar Wrench That is Easily Gripped: It Holds Tightly and will Not Slip. Suitable for Caps of All Ordinary Sizes. Prize 25 Cents

The Strainer Prevents Grounds from being Poured with Coffee, and Also Keeps the Spout Clean. It is Easily Attached and Detached. Price 10 Cents

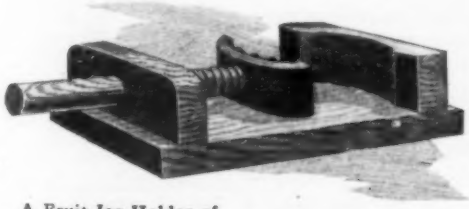


All-Purpose Corkscrew and Milk-Bottle Opener of New Form: Easily Used without Injuring Stopper or Plunging It into Bottle

A Spring Reel That may be Attached to One's Belt Accommodates a Key Chain. The Arrangement Has Good Features for Those Who Carry a Ring of Keys Fastened to a Chain



Holder may be Widely Opened to Receive a Bunch of Asparagus. It Grips Firmly and Prevents Stalks and Tips from being Broken While Cooking. Price 60 Cents

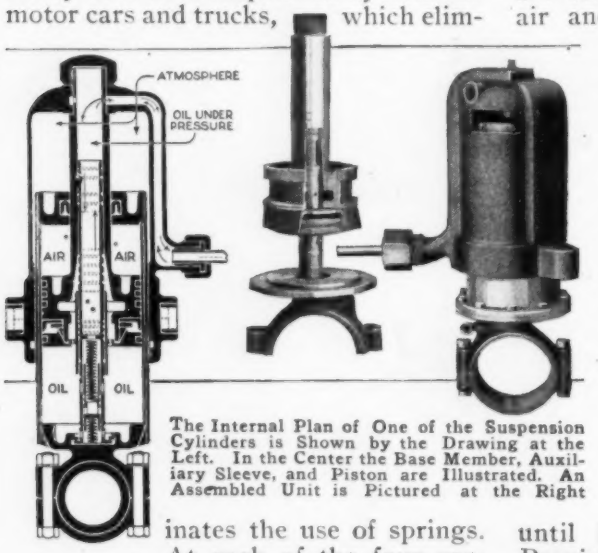


A Fruit-Jar Holder of the Type Illustrated Is Convenient during Canning Season. The Jaws of the Clamp are Faced with Rubber. Price 50 Cents

Corn-Cob Molds Enable a Cook to Serve Corn Bread in a New and Striking Manner. The Mold Is Cast Aluminum and Priced at $2.75

OIL-FOAM CUSHIONS BUILT TO REPLACE CAR SPRINGS

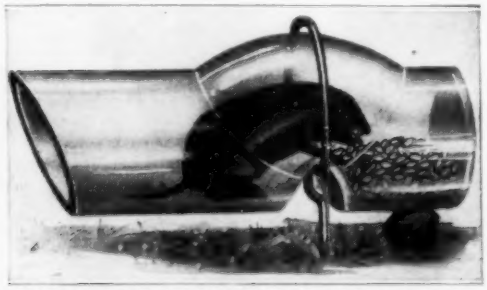
Broad claims are made for the efficiency of a new suspension system for motor cars and trucks, which eliminates the use of springs. At each of the four corners of a chassis is a cylinder. These are attached to the axles by ball and socket joints, and to the frame by pivoted brackets. Road shocks are absorbed by the cushion effect of aerated oil contained in the cylinders, which are connected with a tank that holds air and a lubricant under pressure. Since the oil is kept in a foamy condition, it makes a semicompressible and elastic fluid. The arrangement of the device is such, it is said, that a car passes over obstructions without the vibrations being transmitted to the body. In other words, the latter is supposed to ride with an easy, boatlike motion. Absence of rebound is one of the chief advantages claimed. Three unusual features are worthy of notice. The resiliency of the suspension is automatically regulated to suit the load. In case a machine is overloaded, it cannot be started until its burden has been reduced. Provision is made so that a truck's load automatically governs its speed range.



The Internal Plan of One of the Suspension Cylinders is Shown by the Drawing at the Left. In the Center the Base Member, Auxiliary Sleeve, and Piston are Illustrated. An Assembled Unit is Pictured at the Right

GLASS MICE EXTERMINATOR FOR OUTDOOR USE

A mouse exterminator, designed particularly for use in orchards and fields, consists merely of a tubular piece of glass, 7 in. long and 2 in. in diameter, which is closed at one end. In one side is a sharp depression forming a groove to fit over a supporting stick, or wire, and at the same time preventing the poisoned grain placed within, from falling out. A bulge opposite the depression gives the mouse plenty of room in which to turn around when the action of the poison makes it want to escape. The poisoned bait, while in plain sight, is not exposed to the weather and is not easily accessible to other animals.



Bait for Field Mice, When Placed in This Glass Device, Is Accessible to the Rodents but will Not be Harmed by the Weather Nor Eaten by Larger Animals

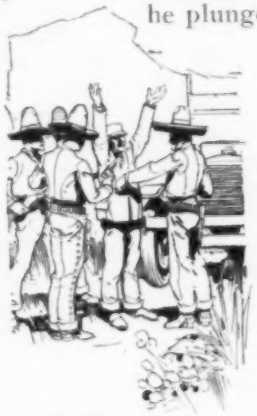
ARGENTINE RADIO STATION TO BE WORLD'S LARGEST

Contracts have recently been let for the erection of a powerful wireless station near Buenos Aires which, according to dispatches from that city, is to be provided with three towers, each the height of the Eiffel Tower in Paris. If the plan is carried out, this will be the largest radio station in the world. The Eiffel Tower is the tallest structure in the world, being 984 ft. high and having a base that spreads over two and one-half acres. The power of the station is to be 11,000 kilowatts.

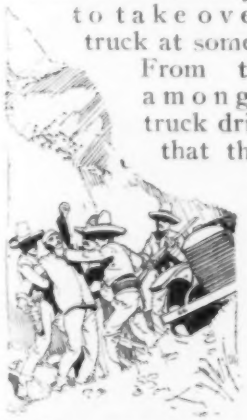
DELIVERING A TRUCK ON THE RIO GRANDE

"It is doubtful if any other driver has experienced the thrills reported by a truck dealer of El Paso."

Drivers delivering new trucks under their own power usually have trouble enough in coaxing their charges to destination, especially in regions where roads exist more in name than in fact, and in long trips over country with which they are unacquainted, but it is doubtful if any other driver has ever experienced the thrills and dangers reported by a truck dealer of El Paso, in an attempted delivery from that city to Marfa, Texas, about 150 miles distant. After having covered 125 lonely miles the driver was suddenly set upon by a band of four masked bandits who searched him thoroughly, but returned a roll of money to him when satisfied that he was unarmed. They then compelled him to alter his course and head toward the Rio Grande, the object of the bandits evidently being to take over the truck at some convenient point. From their conversation among themselves, the truck driver was convinced that they wished to use his machine in smuggling ammunition across the river. They were lavishly supplied with money and offered $4,000 for the truck, with a liberal sum for his services as its driver, temptingly shaking the money before his eyes, but the driver, fearing foul play when once across the river, rejected their offers.



"After having covered 125 lonely miles the driver was set upon by four masked bandits."



"Seeing an arroyo, or depression, ahead, he plunged the truck into it."

After driving about 40 miles he made the decision that if he was living his last day he would end it in the good old United States and determined to ditch the truck at the first opportunity. This soon came, and seeing an arroyo, or depression ahead, with a pit of sand at its bottom, he plunged the truck into it.

"That will settle you, I guess."

The bandits, in a rage at being outwitted by the driver, beat and kicked him so unmercifully that he begged them to shoot him and end his misery. "We have no bullet to waste on gringos," was the taunting reply. They compelled him to walk a mile to a windmill and climb to the top of a large galvanized water tank, about 20 feet high. When he reached the top, one of the bandits, who had followed him up the ladder, pushed him head-long into the tank with the derisive remark, "That will settle you, I guess."

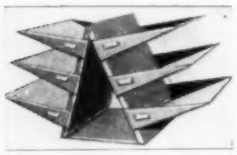
Then began a battle in 10 ft. of water to reach a feed pipe about 5 feet above the water. After several futile attempts to grasp it, during which his strength was fast ebbing away, the last hurtle of which he felt himself capable resulted in victory. Dragging himself up to a hori-

"Then began a battle to reach a feed pipe about 5 feet above the water."

zontal section of the pipe he was able to peer out over the top, and, having satisfied himself that his assailants had retreated, climbed down over the brim, and headed for the north. After several days of wandering, during which he many times fell unconscious, with the blazing sun beating down on his bruised body, he came to a railroad. Fortunately a station was not far away and the first train was boarded for El Paso. A few days later he left for the scene of his harrowing experience and found that the bandits had been unable to extricate the truck from its bed of sand. The dealer, however, with the aid of the several men whom he took with him, salvaged it and completed its delivery as he had originally planned.

STEEL MAIL HOLDER HAS TRAYS OF NEW DESIGN

A steel mail holder, having from four to eight shallow, removable trays attached to the two converging sides of a triangular standard, is one of the newest office accessories. Between the two uprights of the standard is room for rolls and bundles. Each tray has a label holder and is hung on a slant so that papers placed in the device tend to slip down toward the center and are not easily lost out.



HANDY ELECTRIC LANTERN FOR FARM OR AUTO

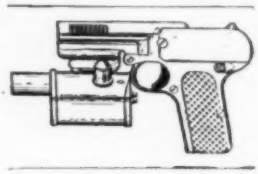
A new electric lantern, useful in camp or for motor-car repair work, operates on a large flash-light battery contained in its broad base. The lantern stands 6 in. high and will burn continuously for 20 hours, or 10 minutes a day for six months, it is claimed.

CLAIMS TO OBTAIN POTASH FROM CEMENT DUST

Steps are being taken at a cement company's plant in Ohio to test the claim of a manufacturer who asserts that he has a process for extracting potash from cement dust. He proposes to erect apparatus at his own expense with which he will draw the dust off by suction while the cement is in process of manufacture, and then wash the potash from it by his secret method.

LAMP FOR CLOSE-RANGE NIGHT FIGHTING

A new attachment for revolvers and pistols is a small electric lamp equipped with lenses which throw a bright shaft of light in the direction in which the weapon is pointed. The device is particularly valuable in routing a burglar or in attacking a near-by enemy at night. It is contained in a metal case and can be carried attached to the underside of the barrel of a weapon, or separately, in the pocket.



RIVER BRIDGE OR TUNNEL WANTED BY NEW ORLEANS

As a preliminary step to bridging or tunneling the Mississippi River at New Orleans, that city has authorized the expenditure of $50,000 to be utilized by a commission of engineers in investigating which of the two methods of spanning the big stream is the more feasible. One of the problems in making a bore would have to do with the air pressure, which would be considerable in digging beneath a river the depth of which is about 100 feet. With respect to a bridge, it has not yet been

determined what type of structure would be most suitable. Some years ago an engineer proposed one of the jackknife type, but he is now inclined to favor another type of span, it is said. Another fact to be determined is the depth to which the foundations would have to be sunk.

TRAFFIC NOT INTERRUPTED BY LAYING OF CONCRETE

A practical method of laying a concrete road has been worked out which permits the public to enjoy uninterrupted use of the highway. The procedure is to lay the pavement in longitudinal halves, part of the old road being used while the first half is laid in slabs in the usual way. As soon as the concrete is cured, dirt is dug out under the edge forming the center of the new highway, so that a lap joint can be made to prevent uneven settling of the two halves. When the concrete is poured for the second half it is tamped down into this depression, forming a support for the adjoining slabs and making a pavement that will remain

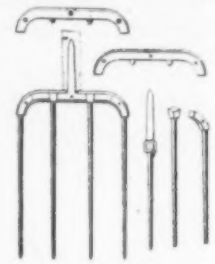
BY COURTESY OF ENGINEERING NEWS-RECORD

Cross Section of a Concrete Pavement Laid without Interrupting Traffic: After the Right Half has Cured the Left Half is Laid with a Lap Joint at the Center to Prevent Uneven Settling

even regardless of any settling. The method of construction described necessarily adds something to the cost.

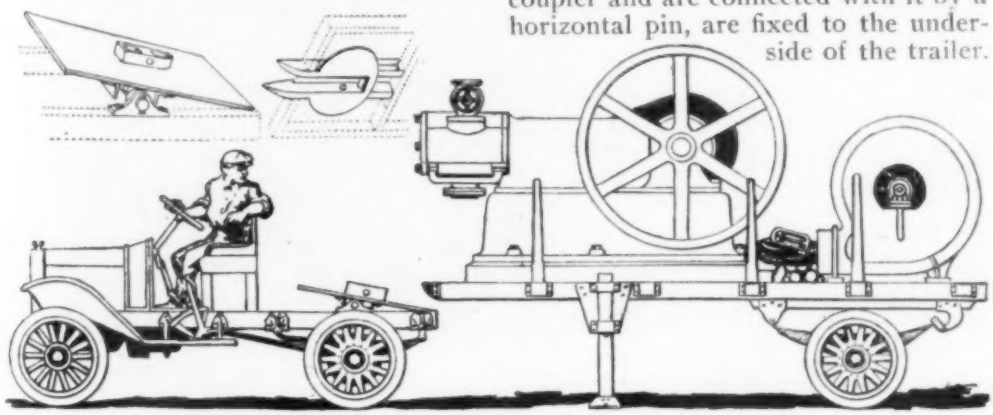
IMPROVED PITCHFORK HAS REMOVABLE TINES

A recent Canadian invention is a pitchfork having removable tines, which can be easily replaced in case they are broken. The metal portion of this fork has a head with sockets into which individual tines can be securely fastened. The head is attached to a wooden handle in the usual manner.



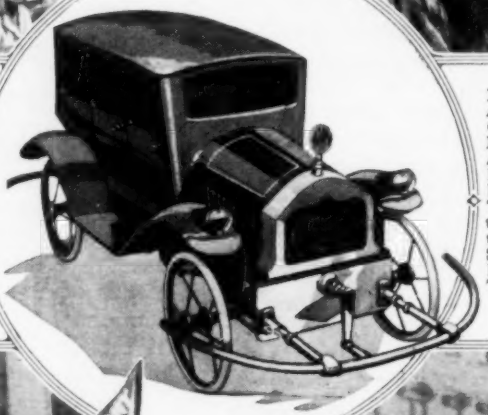
BRAKE-CONTROLLED COUPLER MADE FOR SEMITRAILER

To facilitate the use of two-wheeled motor-truck trailers, a coupling device has been developed that enables an outfit to be backed and maneuvered without difficulty. A king-pin with a shoe-shaped coupler at the top, passes through a faceplate pivoted at the rear of a tractor. Attached to the lower end of the pin is a brake drum with a brake band fastened to the plate. The latter, operated by means of a pedal, controls the turning of the coupler. With the brake locked, for instance, the trailer may be backed in a straight line with perfect ease. A pair of sliding rails that interlock with the coupler and are connected with it by a horizontal pin, are fixed to the underside of the trailer.



The Small Drawings at the Top Indicate the General Character of the Two Parts of the Coupling Device. Below is Illustrated the Ease with Which the Truck and Trailer are Connected and Disconnected

In Shanghai, China, Are American Schoolboys and Girls Who Love Their Home Land, Though They Are Far Away, and They Proved It Recently in a Red Cross Drive in Which Their Junior Organization Shared. This Photograph was Taken at a Special Meeting at Which Plans were Made for a Typical American Campaign



The Toy Automobile at the Right Is Quite Unusual For, When Set, It will Follow Irregular Curves and Turns without a Driver's Aid. When the Car Bumps into an Obstacle It Automatically Reverses and Backs Off, Preparatory to being Started in Another Direction. It is Driven by a Big Coil Spring

Des Moines Boy Scouts Advertise "Clean-Up" Day. When This Troop Marched Past, Spectators Readily Caught the Meaning of the Brooms and Soon a City-Wide Battle against Dirt Was On. The Boys Also Listed Places Not Cleaned Up and Reported Them

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Thousands of Chicago Children Know This Big, Kindly Man, Cy DeVry, Who Has Charge of the Lincoln Park Zoo. This Picture was Taken at a Picnic for Orphan Children, and the Center of Interest Is Mr. DeVry's Favorite Monkey, All Dressed Up for the Occasion. He Seems to Be Particularly Proud to Wear a Cap Like His Boy Admirer's

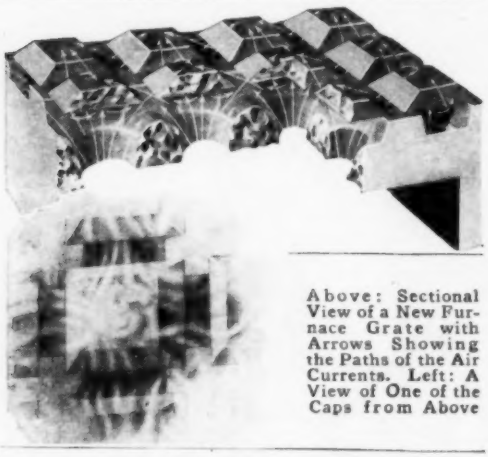
The 14-Year-Old Lad at the Right, Charles B. Purdy of Big Bend, Oregon, may Well Be the Envy of Every Boy in the Land For the Huge Sturgeon Here Shown Hanging beside Him Is One Which He Caught in Snake River. It Weighed 400 Pounds and the Money Obtained by Selling It was Generously Donated to the Red Cross

Members of the Francis Parker Aero Club, School 23, Rochester, New York, and Their Homemade Planes, with Propellers Driven by Rubber Bands: In Their Contests They are Learning Much about Flying and, No Doubt, Some of Them will One Day Fly for Their Country

BY COURTESY OF THE ROCHESTER HERALD

NEW FURNACE GRATE HAS CAPPED AIR HOLES

A new type of furnace grate is now being manufactured which offers an unusually large amount of space for air to enter the fire pot, without increasing the opportunity for fuel to fall into the ash pit. The bars of the grate lie close together and their upper surface is covered with small truncated pyramids, each of which caps a hole beneath. The air enters the fire pot from these holes through openings in the four sides of each cap.



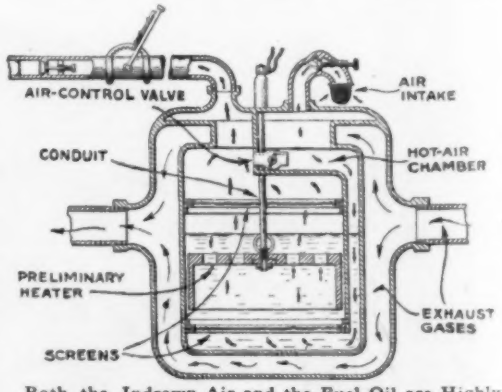
Above: Sectional View of a New Furnace Grate with Arrows Showing the Paths of the Air Currents. Left: A View of One of the Caps from Above

COAST-TO-COAST GARAGES PLANNED BY HOTEL MEN

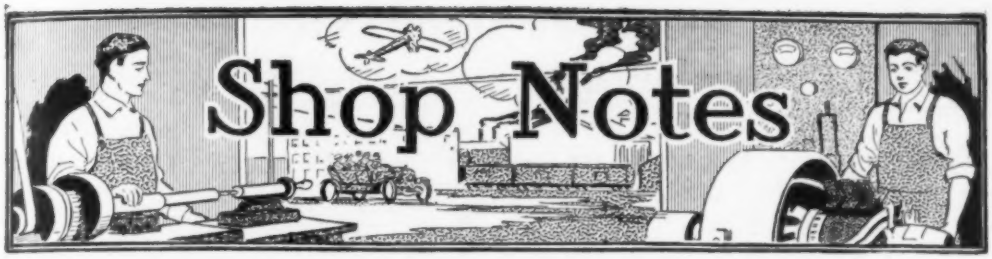
Announcement of plans for the erection at New York of the first of a series of coast-to-coast garages to be owned and operated by a corporation formed by the leading hotel interests, has been made. In every respect the project is a most interesting one. Large-capacity buildings, completely equipped with conveniences for tourist and resident guests of the associated hostelries, are contemplated. The New York garage, which probably will serve as a model for others to be established, is to have a frontage of 200 ft., a depth of 350 ft., and a central location. The building will be of reinforced concrete, five stories in height, with two subsurface floors. Individual compartments, 12 by 20 ft. in size and thoroughly equipped, will be provided for about 900 cars. Private and general repair shops will be outfitted, and the roof space designed as a testing course. Access from one level to another will be offered by double ramps.

ODD KEROSENE CARBURETOR HAS ELECTRIC PRIMER

Peculiar features are embodied in a novel carburetor that has been designed for vaporizing low-grade motor fuels. One of these is a small electric heater that facilitates the starting of a cold engine. The contrivance is double-walled and constructed with an interior fuel chamber. Oil contained in this receptacle is heated highly by hot gases passing through the carburetor, which is connected with the exhaust pipe. A third wall built within the internal fuel chamber provides a duct through which indrawn air travels in reaching the bottom of the tank. In making the circuit it becomes heated before passing into the liquid fuel, beneath the lower edge of the baffle-plate wall, and being broken up by rising through the meshes of a horizontal screen. The resulting vapors are thoroughly mixed by passage through another screen above the level of the oil, and further heated and expanded in their upward circuit by contact with the hot walls.



Both the Indrawn Air and the Fuel Oil are Highly Heated by Passage of the Exhaust Gases through the Carburetor



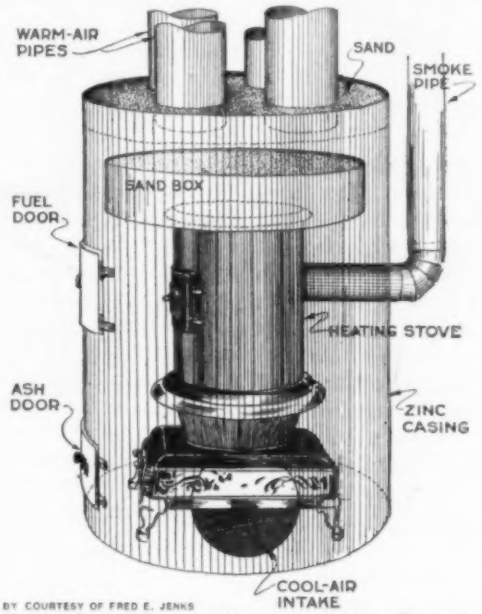
Sand Furnace for House Heating Conserves Coal

By H. L. PHILLIPS

FUEL conservation this winter is one of the big questions before the country, and the idea of using a sand reservoir for heat is offered as a contribution to the kaiser's downfall. The furnaces built by the originator of the idea have been examined by Professor Lockwood, the heating expert of Yale University, who speaks quite favorably of the success of the heater, pronouncing it ingenious and efficient.

The furnace is made from an ordinary parlor stove, which, on account of the better utilization of the heat it furnishes, will supply with warm air a number of rooms, without increasing greatly its coal consumption.

The stove is surrounded by a large cylinder of "zinc," or galvanized iron, in which doors are built for receiving coal and for taking out ashes. A large opening near the bottom of the cylinder provides the cool-air intake, and for good ventilation it may be connected to the outdoor air by a stovepipe, or large furnace pipe. On top of the stove is placed a sand box, which should be about 5 in. smaller in diameter than the surrounding cylinder, and about 6 in. high. It is made of galvanized iron, and filled with sea sand, or other clean sand. About 3 in. above this is the top of the cylinder, which consists of galvanized iron with 3 in. of sand laid upon it. Large holes are cut in the top for warm-air pipes—one to each room or register to be supplied. The smoke pipe is carried out through the cylinder, the hole being cut accurately to avoid air leakage.



BY COURTESY OF FRED E. JENKS

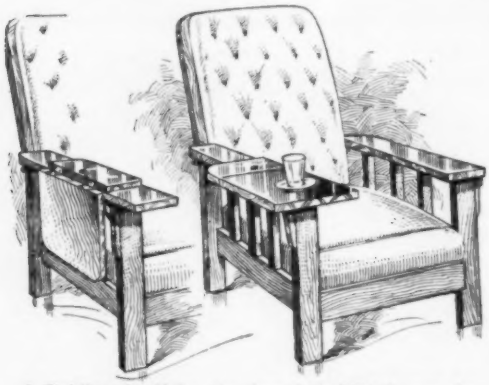
By the Use of Sand to Store and Radiate Heat, the Efficiency of a Stove may be Greatly Increased, Thus Saving Coal

In a thin-walled shore cottage, where the heater was installed, it was found to require only one hod of coal per day, in cold weather, heating the cottage to 70°. The sand furnishes no heat, of course, and cannot increase the fuel value of the coal; the results are due to the utilization of a larger percentage of the heat value of the coal, through the radiating and heat-storing properties of the sand.

¶An improvised thread gauge for measuring female threads is made by turning a soft wooden dowel into the thread. The resulting marks on the wood are then used to determine the number of threads to the inch.

A Chair Shelf That Folds Out of the Way

A shelf like the one illustrated may be made to look well, besides being



A Folding Shelf for the Armchair Which may be Made Both Sightly and Strong

very useful for writing or for holding dishes or drinking glasses. The folding member should be attached to the smaller board by hinges which are set into the wood; the small board is fastened to the arm of the chair by a single bolt on which it revolves. This bolt should be set well forward toward the hinge line, and there should be at least 5 or 6 in. of length behind it, for leverage against the weight on the shelf.—W. H. Sargent, Rutland, Vt.

Tapping a Hole without a Tap

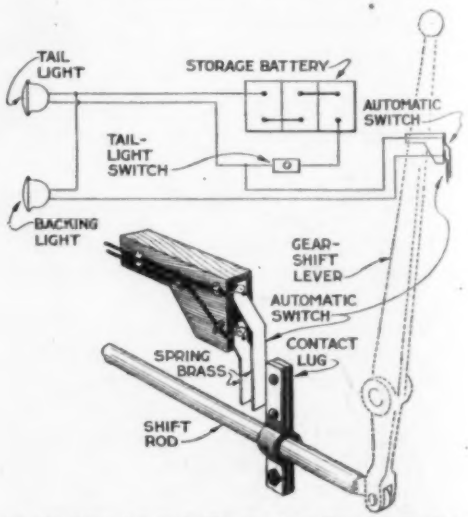
After removing a stay bolt, it was found that a tap of the proper size was not at hand. To retap the hole a stay bolt was used. Its end was pointed with a file, and grooves were filed running longitudinally as in a tap. The bolt was then casehardened, and the retapping of the hole was done in the ordinary manner.

Size for Holding Aluminum Bronze Letters

To do a job of lettering with aluminum bronze on glass, make a size as follows: Mix together 3 parts of good quick-drying varnish, 1 part of chrome yellow in oil, medium shade, and 1 part of turpentine. This size should be fit to take the bronze in an hour after application, when it ought to have the proper tackiness. In warm weather it will be fit in much less time. But try it with the tip of a finger to ascertain when it gets tacky.—Charles Richard, Cleveland, Ohio.

An Automatic Electric Backing-Up Automobile Light

With this auxiliary lighting system, when the gear-shifting lever is thrown to the reverse position, the backing-up light and also the tail light will be illuminated and the entire road in the rear of the car brightly lighted. As shown in the upper part of the diagram, the backing-up light is wired on a separate circuit so that closing the automatic switch permits current to pass through it. The switch, as detailed in the lower part of the drawing, consists of two strips bent from spring brass. These are mounted on a wooden block which provides insulation. The block is bolted under the floor of the car. The contact lug, whereby the switch is caused to close, comprises two pieces, bent from strap iron, which



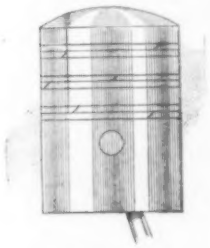
As the Gear Lever is Thrown into Reverse Position, It Switches on a Light at the Rear of the Car

are faced with fiber or rubber. Throwing the gear-shift lever to the re-

verse position causes the contact lug to press the spring-brass leaves of the automatic switch together, whereby the circuit through the backing light is closed. Note that the circuit is so arranged that when the tail-light switch is in the off position the backing light cannot be illuminated. For the backing light, an ordinary electric tail lamp, which has a clear lens instead of the usual ruby one, is used.—Parke Goode, Covington, Ky.

Improving Compression of Old Gas Engines

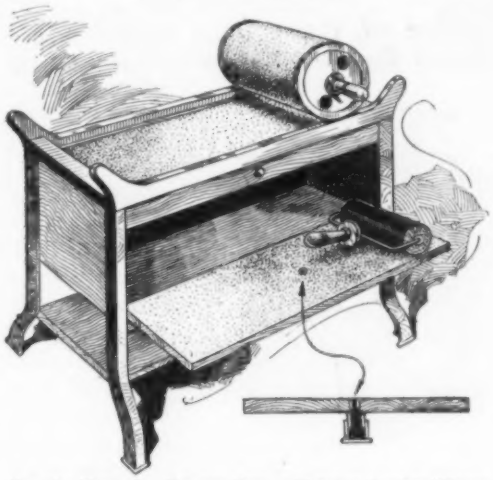
Often when old gas engines are fitted with new piston rings, the cylinder is found to be so badly worn out of round that even a new ring does not give good compression, without an excessive amount of wearing in. In such cases compression may be improved by using two rings in each slot. For best results, the joints of rings in the same slot should be 90° apart. This practice is perhaps a little more likely to give piston-ring trouble, but it may add years to the useful life of an engine.—Archibald A. Richards, Manchester, New Hampshire.



Grease Cup to Contain Ink for Proof Press

The proprietor of a print shop, having a roller proof press, became tired of the usual unsightly daub of ink on the roller shelf, and screwed an ordinary automobile grease cup into the middle of the bottom of the shelf, so that the open end was flush with the inking surface. When he needs more ink for his roller, he gives the grease cup a turn, which places the ink directly in the center of the inking shelf. It is distributed by the hand roller in the usual way.

A good grease cup with accurately cut threads should be used. When the ink is all gone, the cap is removed and

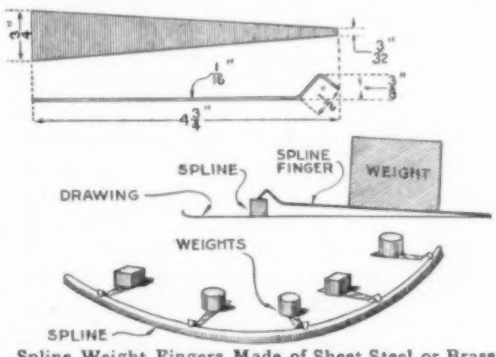


By the Use of a Grease Cup, a Printer Avoids Waste of Ink, and Gets Better Distribution of Ink for His Proofs

refilled.—Thomas W. Livermore, San Antonio, Tex.

Fingers for Holding Spline Weights in Drafting

In drawing long curved lines, especially when curves are drawn from points found by calculation or measurement, a flexible ruler, or spline, is a convenient tool. One problem, however, is to hold it firmly while adjusting or drawing the curve. This may be done by providing a number of metal fingers as illustrated, with lead or other heavy weights fastened to

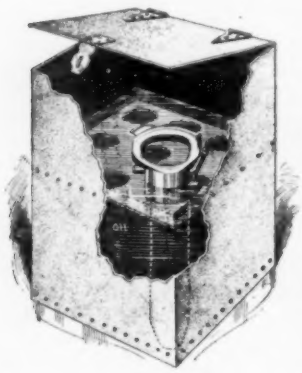


Spline Weight Fingers Made of Sheet Steel or Brass Are Helpful in Drawing Curves

them. The dimensions, of course, will vary with the flexibility of the spline.

Storing Air Hammers in Oil Improves Working Quality

One of the eastern railroads has found that the action and durability of air hammers is much improved if they are deposited every night in a tank of oil. The illustration shows the steel box made for this purpose. The hammers rest upon a plate with holes drilled to fit the hammers. The amount of oil put in the tank should be just sufficient that, when each hammer is in place, the oil level almost reaches the handles.—L. K., Pittsburgh, Pa.



Calibrating Automobile Gasoline Gauges

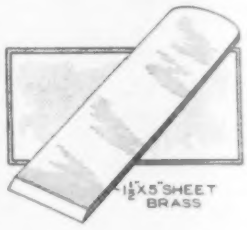
Many automobiles are provided with a gauge which is intended to show the amount of gasoline in the tank, but reads only in fractions of a tankful, rather than in gallons. The gauge may be calibrated, or marked directly in gallons, as follows: Take the glass cover off the gauge, and drain off all the gasoline in the tank. Then pour in one gallon of gasoline, using a measure which has been tested so as to make sure it holds just 231 cu. in. Make a mark on the gauge with the point of a sharp pencil to show where the pointer stands, and pour in another gallon, repeating the operation until the tank is full. If the tank is a horizontal cylinder, the spaces between the marks will look somewhat as shown in the illustration; if the tank is of irregular shape, the spaces will be irregular also.—George S. Ferris, New York, N. Y.

Removing a Broken Nipple from a Coupling

A small pipe nipple, broken off inside a coupling, was removed by driving a sharp-pointed cape chisel into the broken nipple. The chisel was then turned with a wrench, thereby also turning the nipple out sufficiently, so that a hold could be taken with a small pipe wrench for its complete removal.

Brass Scraper for Cleaning Tools

Scraping rust or dirt from saws, planes, and other tools, is a common practice, and when a steel-edge tool is used for the purpose the surfaces cleaned are often scratched or marred. A better tool for this work, and one which will not scratch the surfaces, is a sharpened strip of brass, 1½ by 5 in. long. The handle end should be rounded off, and the edges broken slightly with a file or emery cloth, to make it convenient to handle the scraper. The tools to be cleaned should, of course, be oiled before applying the scraper.



Safety Pin Makes Good Picture Hook

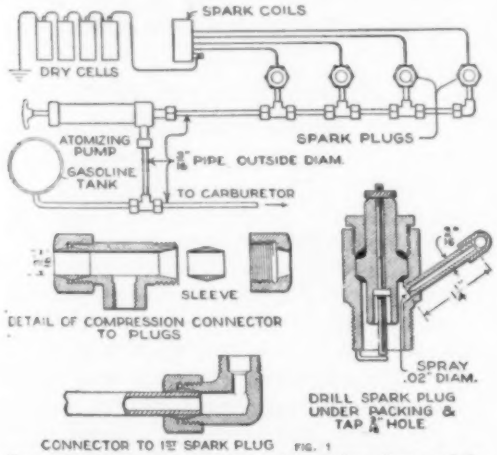
An ordinary safety pin makes a useful hook for hanging small pictures. Drive the pointed end of the safety pin into the wall as far as the coil, if possible, allowing the hook end to hang down against the wall. A picture hung on such a hook cannot easily be knocked down, because the point of the hook is against the wall instead of pointing outward.—L. E. Turner, Hartford, Conn.

A Spark-Plug Atomizer Starter for Automobile Engines

By GEORGE A. LUERS

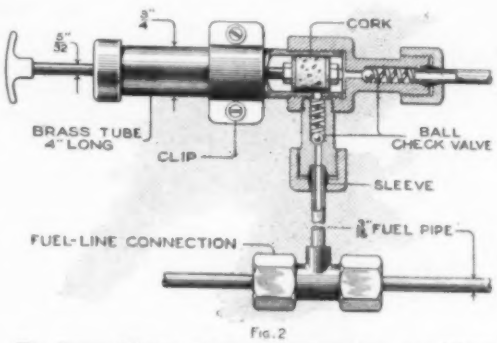
A TYPE of automobile starter which can be installed with great satisfaction, on cars which were built for hand cranking only, is the one here described, consisting of an apparatus for placing an explosive mixture directly at the point of ignition. The mixture is ignited by whatever means is provided for "starting on the spark"; this varies with the type of ignition, and is not ordinarily available in engines ignited by magneto only. On others, however, means are usually provided for producing a spark when the engine is at rest.

The complete outfit is shown in outline in Fig. 1, as arranged for a car with vibrator ignition, using a battery of dry cells. A pressure pump located on the dash is connected to the gasoline line, and its discharge end is connected to a tube leading to a row of tees with an elbow at the end, which lead into the spark plugs. A plug, as fitted with this nozzle, is shown in detail in Fig. 1; almost any plug can be used, of the type where the porcelain can be removed for cleaning. With the plugs screwed in tightly, make a mark on each one to locate



General Arrangement of the Atomizing Automobile Starter, Showing Tubes Leading to Spark Plugs

accurately the point which will be toward the tee; remove the plugs, and drill and tap holes into them of proper size to take gasoline-line tubing of 3/16-in. outside diameter, being careful to strike the interior of the plug at a point below the porcelain. The



The Pump Which Forces Gasoline into the Plugs can be Made in the Home Shop from Scrap Metal or from an Old Pressure Pump

short piece of tubing which extends from the tee into the plug should be peened down at the extreme end to an opening not exceeding about 1/64 or .02 in. in diameter, so as to form a nozzle.

The pressure pump may be made from pieces of pipe and scraps, but an old oil pump or gasoline pressure-feed pump may be readily modified for this use. On the upstroke the pump sucks gasoline from the fuel line, and on the downstroke delivers it to the spark plugs, this action being forced by the two ball check valves shown in Fig. 2.

To operate the starter, simply push the pump handle up and down once or twice, and produce the spark by the means provided. A start should result, even in the coldest weather. It might be thought that the small opening in the spark plugs would cause loss of power; this is practically negligible if the nozzles are small enough, but can be prevented if desired by placing a ball valve in each of the tubes to the spark plugs. The expense of operating such a starter is almost nothing, and its simplicity has much to recommend it.

¶ Wet shoes dry more quickly, and are held in shape better, if stuffed with newspaper.

Jig for Drilling Holes near Ends of Flat Bars

An adjustable jig used for drilling holes in a given location through the ends of flat bars or strips is shown in

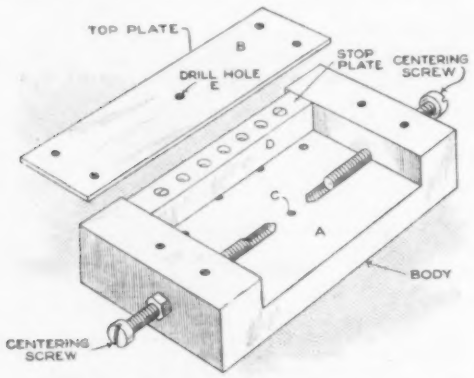


FIG. 1
Drilling Jig Adjustable for Position of Holes in Bar in Relation to Length

Fig. 1. It is employed when a number of duplicates are to be produced. The top plate B is held down on the body A with machine screws. Then the jig is placed on a drill press. The bar to be drilled is inserted between the centering screws in A until its end butts

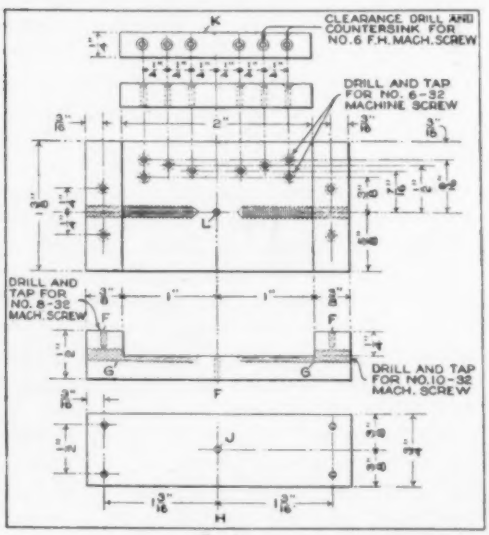


FIG. 2
Jig Adapted to Varying Thicknesses of Bars Drilled by Small Increments

against D. The rotating drill is then forced down through the template hole E, through the bar, and into the hole C. Assuming that the centering screws and stop plate have been properly located, a hole will be drilled at the proper location at the end of the bar. By varying the position of the stop plate D and the adjustment of the centering screws, the location at which the hole is drilled through the bar end can be varied accordingly.

In Fig. 2 are shown details of a jig which will accommodate pieces, $\frac{3}{8}$ in. to $1\frac{3}{4}$ in. wide and $\frac{1}{16}$ in. to $\frac{1}{4}$ in. in thickness. The body F is of machine steel. It is formed by cutting a groove, 2 in. wide and $\frac{1}{4}$ in. deep, in a block of $2\frac{3}{4}$ by $1\frac{3}{8}$ by $\frac{1}{2}$-in. machine steel. Before machining out the groove, the two holes, G, for the centering screws, are drilled and tapped to the bottom. Machine steel, $\frac{1}{8}$ by $2\frac{3}{4}$ by $\frac{3}{4}$ in., is used for the top plate H. The metal around the guide hole J should be casehardened to prevent the drill from spotting holes in the plate and from wearing the guide hole out of true. The stop bar K is drilled and countersunk for No. 6-32 flat-head machine screws. The six holes in this bar are provided to allow for longitudinal adjustment of the stop plate by $\frac{1}{16}$-in. increments. The positions of the eight tapped holes in L provide this adjustment.—E. S. Goodell, Marseilles, Ill.

To Save Time and Have Clean Washbowls

The amount of scrubbing necessary to keep washbowls looking clean depends largely on the way they are used. Two men can go into a shop washroom, use two washbowls that have just been cleaned, and, after they leave, one bowl will be dirty and the other clean—nor has either man spent any considerable time cleaning the bowl. It's all in the way the hand washing is done. It is just as easy to throw some clean water around in the bowl with the hand, as it is to rinse the hands off in any other way, and it eliminates the solidified soapsuds which always indicate that a careless person has been using the bowl. The same thing ap-

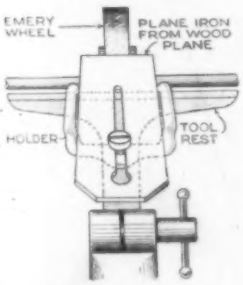
plies to the cake of soap—a fraction of a second spent in passing it under the running water from the faucet, before laying it away, keeps it looking neat for the next user.

A Convenient Glaze for Rough Surfaces

Carriage painters' "draw putty" is used for glazing over an uneven surface, and is made as follows: Take one part each of best whiting and white lead in oil, and two parts of white lead dry; reduce to a plaster with equal parts of quick-rubbing varnish and coach japan, kneading the mass until it is perfectly smooth or free of lumps. This is spread over the panel or other surface with a wide glazing knife, and it may be sandpapered the next day.

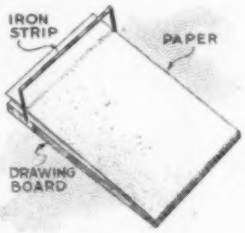
Holder for Grinding Edge Tools on Emery Wheel in Wood Lathe

It is often convenient to grind fine edge tools on an emery wheel which is rotated in a wood-turning lathe. Pattern-makers frequently follow this practice. If the tool being ground is held by the hand against the rotating wheel, it is difficult to maintain a proper angle to insure an even edge, and to prevent burning. By using the tool holder shown in the sketch, the possibility of burning is minimized, and an even edge and a proper angle are insured. Hooks on the legs of the holder slide along the crest of the tool rest in which the emery grinding wheel is mounted. The tool being sharpened is supported on the holder. When grinding the plane iron of a wood plane, it may be clamped to the holder with a set-screw, as shown.—R. H. Dixon, Newark, N. J.



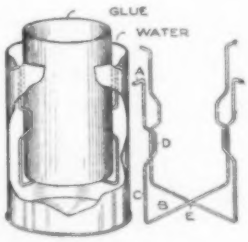
Drawing-Board Attachment to Hold Paper without Tacks

A drawing board with iron strips, as shown in the illustration, enables one to fasten a sheet of paper securely without thumb tacks. If the board is a thick one, the pins on which the strips turn may be set far enough below the upper edge to prevent interference with the T-square; otherwise it will be necessary to set the strip into the board an amount equal to the thickness of the strip, plus about $\frac{1}{16}$ in. for clearance. The strips should be countersunk and fastened with flat-head screws. In addition to freedom from the bother of lost thumb tacks, the arrangement permits the use of the whole surface of the board for drawing, without allowing room for tacks.—S. G. Ryder, East Rockaway, New York.



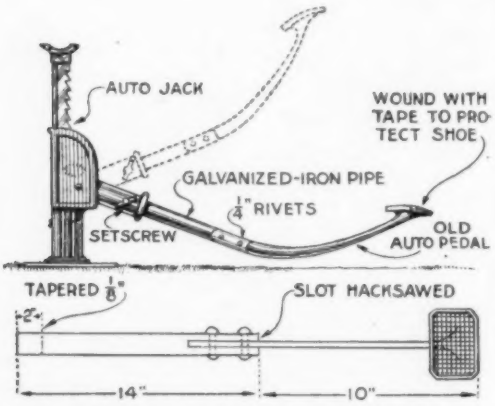
A Reservoir Glue Pot Made from Two Cans

A vessel for heating glue should be inclosed in another vessel filled with water, in order to regulate the temperature of the glue, as in the kitchen "double boiler." Such a vessel can be easily made from two tin cans, by bending two pieces of stiff wire to the shape illustrated, and fitting them into the larger can. They should be soldered together at E. The inner can is prevented, by the parts of the wire at B, C, and D, from touching the outer one. The wire frame hangs by the ends A in notches cut in the outer can.—Edith M. Thayer, Jackson, Mich.



Pedal Extension on Auto-Jack Lever Saves Labor

When a mechanic wants to relieve himself of some of the back-breaking

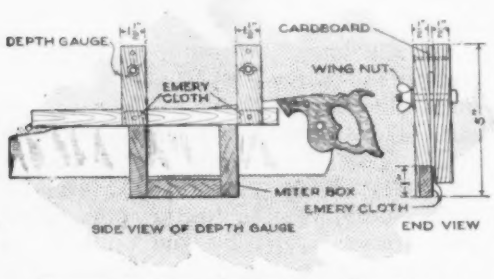


Auto Jacks can be Made to Work Easily by Lengthening the Leverage

work of jacking up a heavy load, he lengthens the leverage with a bar or a piece of pipe. Here is a plan to lengthen the leverage of an auto jack. The extension of the lever by adding an old pedal saves much work and soiling of clothes. The cost is nominal, as an old auto pedal is easily procured. The sketch shows how the work is done.—P. P. Avery, Garfield, New Jersey.

Depth Gauge for Wooden Miter Boxes

When one is making saw cuts in a miter box to a certain depth, it is almost impossible to do good work without a gauge, or stop, on the saw.

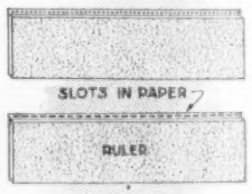


Homemade Gauge Converts Any Saw into an Adjustable Miter-Box Saw

While saws made for this purpose can be obtained, it is often more satisfactory to have a gauge which can be attached to any ordinary saw. The illustration shows how such a gauge can be made from a few sticks of wood, having the added advantage that it is adjustable for depth, so that much blocking up of work can be avoided. The gauge is fastened on the saw by tightening the two wing nuts. If it is desired to saw a number of slots to a distance of ¼ in. from the bottom, for example, a good way to set the gauge is to put a piece of ¼-in. wood in the miter box, place the saw in the box resting on the piece of wood, set the gauge, and remove the piece of wood.

Dot and Dash Ruler Easily Made

A timesaving tool for the drattsman is a dot and dash ruler. For pencil work, the one illustrated is very convenient, and can be made with a little careful work. It consists of an ordinary straightedge with a thin strip of steel, celluloid, or hard paper, glued under it, which has a line of small holes, the proper distance away from the edge of the ruler so that a pencil point of average sharpness will just strike the holes or slots. The holes may be marked in the strip with a needle point and drilled with a small drill, or a machine-perforated piece of paper may be used, cutting out and joining together with a knife every two or three holes, for a dash ruler. If it is desired to make a complete set of rulers of celluloid, or of thin steel, for dots, dashes, and combinations of dots and dashes for center lines, etc., a good plan is to make a template of thicker metal with the round holes only. The various strips can be drilled through it, and



dash holes cut out with a small cold chisel as required.—Reginald R. Wayt, Pittsburgh, Pa.

Pneumatic Riveter Useful in Wood Shop

The compressed-air riveting machine is found to be extremely useful in woodworking establishments handling large work. It is made adaptable by fitting, instead of the hammer tool, heavy wood-cutting chisels and gouges with shanks shaped to fit in the machine. Mortise and tenon joints can be chipped out quickly and easily with the chisel tool. In the shop where large built-up work has to be shaped by hand, the gouge will be found convenient for roughing off. I have used this means several times to shape large, irregular wood patterns, such as hawser pipes and struts.—Arthur A. Richardson, Center Barnstead, N. H.

Reliable Oiling Systems for Chain-Driven Trucks

The difficulty and uncertainty of keeping the chains oiled is one of the main objections to the old reliable chain drive. Two methods of overcoming this are shown in the illustrations.

The gravity oiler is the simpler one. It consists of two oil cups, mounted on brackets, so as to be directly over the small sprockets on the jackshaft, with two tubes or spouts, A, hanging down from each so as to place the oil on the sides of the sprocket, whence it is thrown out into the chain by centrifugal force. The construction is evident from Fig. 2; the bracket is bolted to the frame, and the ¼-in. spouts are soldered to the oil cup. Enough oil to lubricate the chain once thoroughly is put in the cups just before starting on a run, and it drains out by gravity.

The pressure system, shown at the left side of Fig. 1, is more expensive, but much better and more convenient. Spouts are arranged as in the gravity oiler, but they are soldered to a pipe extending across the frame, which has a tee in the middle. From the tee another pipe runs back, through a stopcock, placed handy to the driver's seat, to an oil tank. Air pressure is provided in the tank by a tube leading to a bicycle pump, and a screw plug is provided in the tank, for filling with oil. The tank should be filled with oil while the stopcock is closed; then, while running, the stopcock can be opened whenever desired, the pressure raised to 10 or 20 lb. by means of the pump, and sufficient oil run onto the chain to lubricate it.

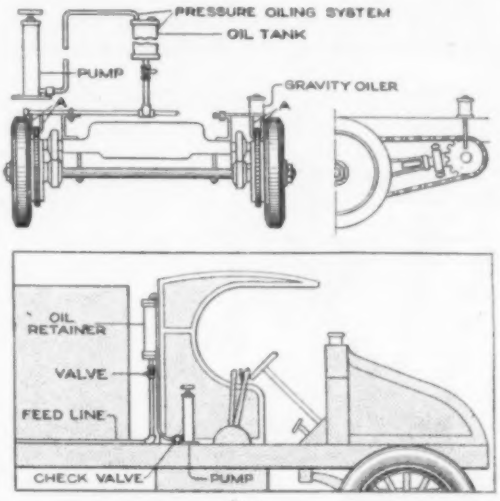


Fig. 1

The Oil is Thrown onto the Side of the Small Sprocket, and Works into the Chain

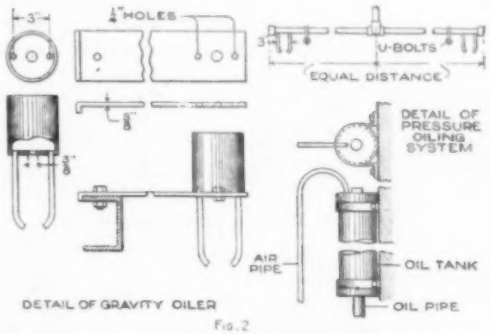


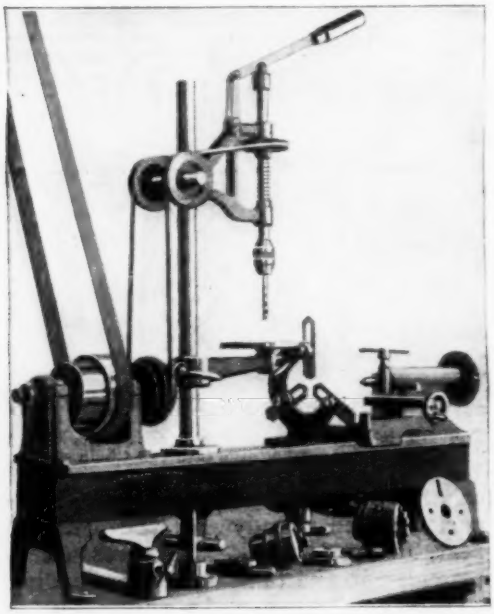
Fig. 2

Details of the Two Systems, Showing How the Apparatus is Attached to the Frame

A heavy oil should be used that will stick to the chain.—Ed. H. Samen, Chicago, Ill.

Drill-Press Attachment for Bench Lathe

In the small shop a drill-press attachment for a bench lathe, such as



The Drill Press Takes Its Power from the Lathe, and can be Readily Mounted and Detached

the one here shown, is often useful. The standard is a piece of 1-in. cold-rolled shafting, while the spindle is a piece of ½-in. drill rod. The drill-press belt is tightened by raising the head; all the clamping is done by tangent screws. The pulleys on the head run on steel pins. A lever feed forces the drill down into the work; it is returned by a spring.—James H. Beebee, Rochester, N. Y.

Shellac Gives Protection against Wear

A coat of brown shellac on an automobile tire, which is to be stored or carried as a spare, will assist in preventing oxidation and deterioration.

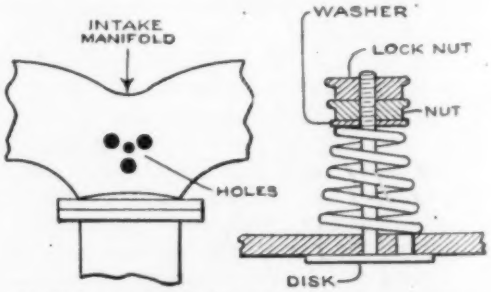
White shellac can be used on a great many articles to form a transparent waterproof coating. Drawings, photographs, printed or written documents, or any other papers which must be frequently handled or exposed to dirt, will be the better for such a coating.

Increasing the Power of an Auto Engine

The device illustrated was designed to admit additional air to the manifold, and thus completely vaporize the gasoline. At a convenient point on the intake manifold, drill three holes, ¼ in. in diameter, and one, ⅛ in. in diameter. The holes must be located within a radius of ½ in. A disk of iron, 1¼ in. in diameter, is fitted with a ⅛-in. rod, 1½ in. long. The upper end of the rod is threaded for ½ in. with an 8-32 die. The parts are assembled as shown in the sketch. The stem is riveted in the ⅛-in. hole in the center. The three ¼-in. holes are covered on the inside of the manifold with the disk. A spring is slipped over the rod, followed by a washer and two lock nuts. Use sufficient tension to hold the disk firmly in place.

Start the engine and advance the throttle about one-quarter. Release the lower nut gradually. A point will be reached where the engine gains in speed, as the vacuum formed in the intake draws down the disk covering the holes. Do not loosen the tension too much, or the engine will not throttle down to low speeds.

A roadster equipped with this device, driven by a 22-hp. engine, showed



Air Valve in Automobile Manifold Increases Power and Speed of Car

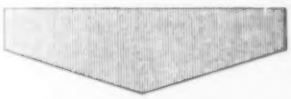
a remarkable increase in power. The results as applied to a motor truck were also satisfactory.

Paraffin Grease for Auto and Wagon Springs

An excellent grease for inserting between the leaves of auto and wagon springs can be made by melting several candles, and adding a small quantity of flake graphite. When this is placed between the blades of springs, its replenishment is very seldom needed, as it resists the effect of water and heat better than lighter lubricants. Rust formation is prevented, and besides adding to the life of the spring, it makes the vehicle ride easier.

The Proper Shape to Cut a Shim or Filler

Shimming bolts and flues after they have been placed is a task which requires much patience. It has been found that to make the shim enter the space in the hole around the bolt or flue, without difficulty, the shim should be cut triangular. An equilateral triangle is not necessary; merely enough angle to give the shim a good starting point when rolled up. After the shim has been cut and rolled, the point is inserted into the space to be shimmed, and the shim is tapped lightly with the hammer. Due to the pointed end, the shim will conform to the space more readily than if it is cut rectangular.



Relieve Compression of Cylinder Which is Not Firing

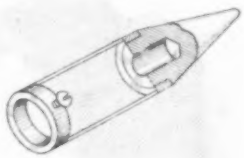
When it is necessary to drive an automobile or motorcycle with one or more cylinders missing fire, the compression should be relieved in the missing cylinders by opening the petcocks or removing the spark plug. This will often make a big difference in the ability of the remaining cylinders to pull the machine.—Henry Priebe, Kent, Ohio.

Small Wheels Aid Handling of Wheelbarrow

The wheelbarrow is a peculiarly useful vehicle where a load must be transported along a plank or narrow path, but where plenty of space is available it often seems foolish to carry so much of the weight in the hands instead of on wheels. Wheels can be placed on the legs of the ordinary wheelbarrow to very good advantage; they should have wide treads, and if necessary such treads can be cut from sheet iron and riveted around the wheels used. The extra wheels will prove particularly useful in going over curbstones and such elevations.—Herault A. Trester, Milwaukee, Wis.

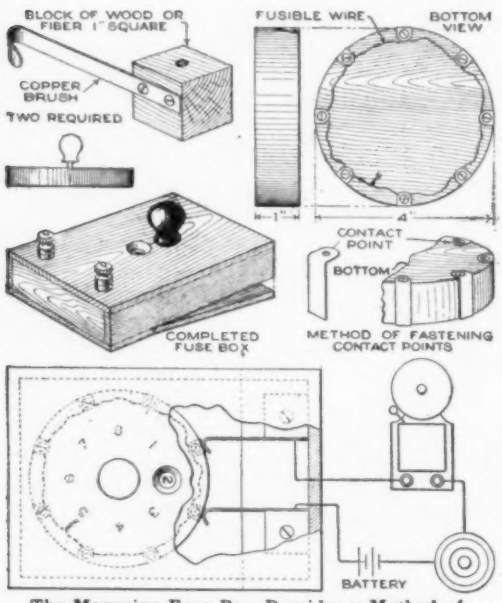
Soldering Iron for Attachment to Blowtorch

For many purposes, a soldering copper which is permanently attached to the blowtorch will do as good work as an electric soldering iron, and at a much lower cost. To make the one illustrated, cut down a short piece of 1-in. pipe to the shape shown, and fit the block of copper into the end. The copper should be forged or turned to a cone or pyramid shape, and may be fastened into the pipe by peening its inside face. A hole drilled in the copper, as shown, will cause it to heat up more quickly. The other end of the pipe frame is then fastened to the blowtorch by a setscrew. A handle may be made to fit in the same place when it is desired to use the soldering iron in the ordinary way.



A Timesaving Magazine Fuse Box for Experimental Circuits

The magazine fuse box illustrated will save many minutes when working



The Magazine Fuse Box Provides a Method of Quick Renewal

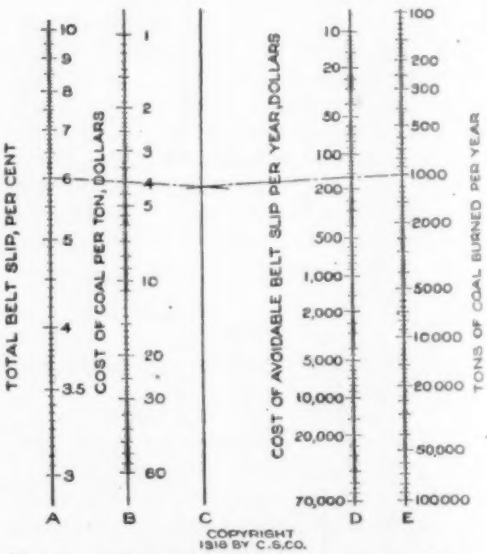
with circuits which may blow a fuse very frequently. It consists of a rectangular box, with two binding posts connected to copper brushes which bear against adjacent contact plates of brass, mounted on a circular block of wood. A ring of fuse wire is run around the bottom of the block, and clamped with a screw under each contact plate, and a knob is provided, extending through the cover, by means of which the block can be rotated to the next position whenever an excess of current blows out the wire between two adjacent plates. The numbers on the top of the block, visible through a hole in the top of the cover, tell which section of the fuse is in use; when No. 8 shows, it indicates that the next time the fuse blows, a new wire must be inserted. This is done by opening the hinged bottom of the box; the top may be screwed on and need be removed only in case of trouble.

Unless thoroughly insulated and lined with asbestos, the device should not be used in circuits of over six volts.—W. Jarand, Montreal, Canada.

Elimination of Belt Slippage Conserves Fuel

In these days when every effort should be made to conserve fuel which is so badly needed to transport soldiers and guns, it will pay every shop foreman or superintendent to look into the subject of belt slippage. When it is realized that a loss of five per cent by slippage of the main belt is equivalent to the theft of five per cent of the coal pile, and that this loss is repeated every time the power is transmitted through a belt, the matter becomes still more important.

Much study has been made of methods for saving this power, and it can be said now that by proper precautions the slippage of any properly loaded belt can be cut down to about two per cent—this amount being due to the "creep" of the belt around the pulley, and being thus unavoidable as long as



The Use of This Chart Enables the Superintendent to See How Much He Loses per Year by Belt Slip

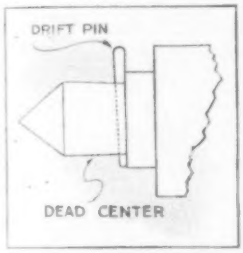
the belt has elasticity. Inasmuch as the slippage on some belts may run as high as seven or eight per cent, it may

be readily seen that a considerable amount of money is involved.

A concern which markets a preparation to be used for this purpose has prepared a chart which shows readily the cost per year of belt slip to any plant, over and above the minimum which cannot be avoided. To read the chart, draw a line through the appropriate points on scales A and B, and from the point where this line intersects line C, draw another line to the proper point on scale E. The intersection with scale D will show the result. For example, when 1,000 tons per year of $4 coal are used and the belt slippage is six per cent, then the annual loss is $160.

Removing Tailstock Centers Easily by Means of Drift Pin

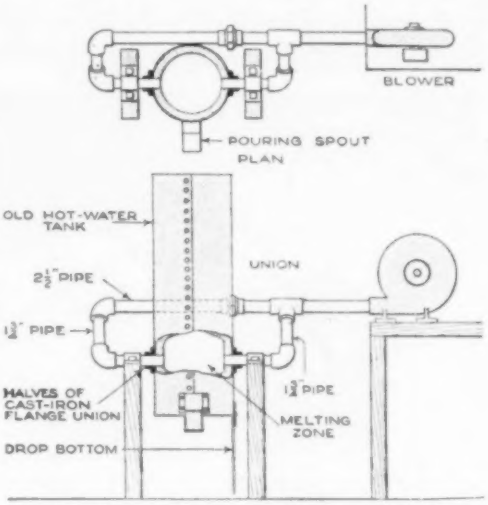
Lathe tailstocks are built so that the center may be removed by working it back to the end of its travel, when it will be pressed out from the end. This often takes considerable time and trouble, which may be avoided by fitting the centers with holes, or slots, so that they can be driven out with a few light blows on a drift pin, as is done in the drill press. The pin should be fastened with a chain, and may be carried in the oil well on the tailstock and used also for dropping oil on the dead center.—Charles R. Elliott, Los Angeles, California.



Cupola Made from an Old Boiler

A practical cupola, melting from 100 to 150 lb. at a charge, can be made from an old hot-water tank, some piping, and a blacksmith's motor-driven blower. The tank is cut off at the top for charging. The sketch shows the details of construction.

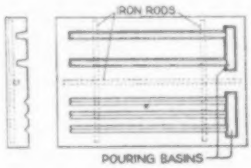
The cupola is lined with thin fire brick from the pouring spout to the top of the melting zone. The remainder of the cupola can be lined with a mixture of fire clay and sharp sand. Stove coke is used as fuel. The iron to be melted must be broken up in small pieces.—A. Gemmell, Ansonia, Connecticut.



Cupola in Plan and Elevation: The Blower Discharges through the Pipes and Tuyères into the Melting Zone

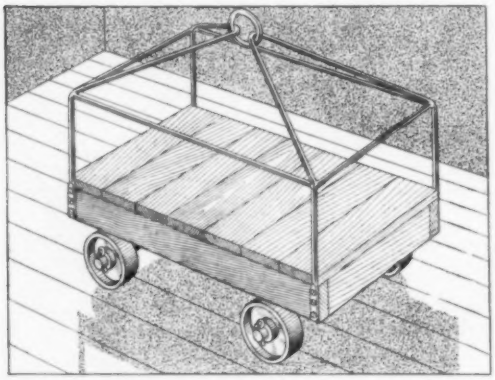
Mold for Solder Easily Made of Plaster of Paris

Scraps of solder should always be saved, melted up, and poured into bar or wire form. A convenient mold can be made of plaster of Paris. The wooden patterns for the mold should first be made; their proportions being selected to suit the user's convenience. Pouring basins should be molded at the end of the grooves, and at least ¼ in. deeper, so that the solder may run out evenly into the grooves. The plaster may be molded in a rectangular wooden frame, laid upon a glass or other smooth surface. Iron rods should be molded into the plaster in order to strengthen it.—William B. Jones, Medford, Mass.



Shop Truck That may be Picked Up by Crane

The use of a truck that can be picked up by an overhead crane, as illustrated,



The Truck can be Carried by a Crane without Extra Ropes or Cables

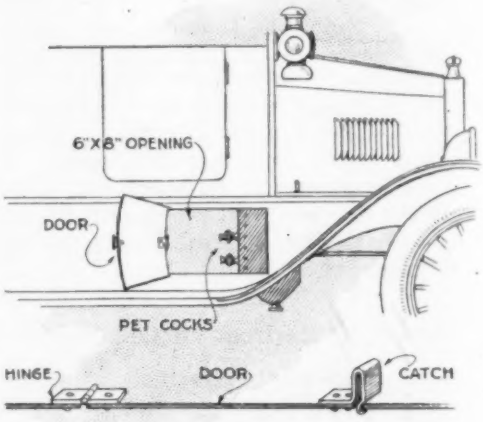
will save much time in handling materials. For instance, a heavy piece of machinery may be carried on such a truck to a bench; the truck can then be picked up by a crane, raised to the level of the bench, and easily transferred to it. Again, if the progress of the truck is blocked by obstacles in its path, it may be lifted over them by a crane. To convert an ordinary truck so that it may be so handled, secure two steel rods of a length depending on the size of the truck. Flatten the ends, and drill three bolt holes in each. One end of a rod is bolted to each corner. Horizontal brace rods may be welded in place, and a ring at the top is provided for the crane hook. The load should be balanced on the truck when lifted, so that it will not slide off.—Kenneth Coggeshall, Webster Groves, Mo.

Boring Large Holes in Glass

Take a piece of brass tube, about 1½ in. long, and the diameter of the hole to be made, and file small teeth in one end. Make a shank which will fit a drill-press chuck, or use a discarded drill shank. Taper one end slightly to fit into the brass tube about ¾ in. Small holes may be bored in the tube just below the end of the shank for the purpose of lubrication. Use a mixture of gum camphor and turpentine for a lubricant, to which is added a little emery flour to make a thin paste. The speed and feed of the drill must not be sufficient to develop heat, as this may crack the glass. This is a process of wearing rather than of cutting. When the upper hard skin of the glass is cut, the drilling will progress rather easily until the lower glass skin is reached. To prevent cracking when the drill goes through, drill a small hole through the lower skin, and then ream out to size. The same method may be used to cut glass along straight lines, by using a copper or brass disk with small teeth on the outer edge, and rotating in a lathe or milling machine.—J. Garrett Kemp, Stillwater, Minn.

Testing Oil Level in Automobile Crank Cases

On some light automobiles the only method provided for testing the level of oil in the crank case is to open pet cocks, which are hard to get at without crawling under the car. By the method shown it is possible to avoid this trouble without the danger of



A Small Door in the Running-Board Shield Overcomes Troublesome Methods of Oil-Level Testing

breakage which is present when a gauge glass is used. A rectangular

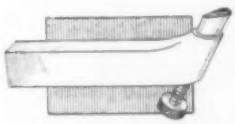
opening is cut in the running-board shield, and is provided with a hinged door. The door will not rattle if a spring catch is used, and it will be no detriment to the looks of the car if painted the same color.—George A. Brown, Des Moines, Ia.

Garden Hose Protects Dishes against Chipping and Breaking

An inch of old garden hose, put on the tip of the faucet, will save many dishes from being chipped or broken while rinsing the dishes under the faucet.—Charles H. Crossman, Brooklyn, New York.

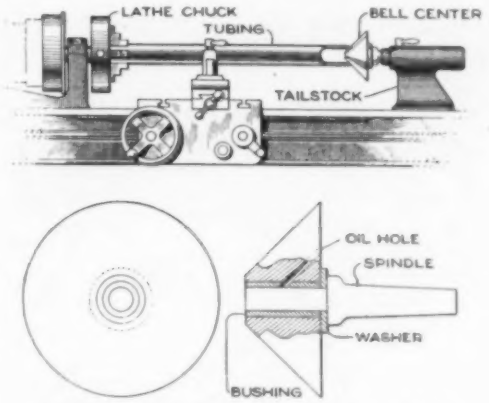
Converting Broken Drills into Lathe Tools

Broken twist-drill shanks make excellent lathe tools, particularly if the drill happens to be of high-speed steel. A holder for such pieces of broken drill is made as illustrated. A set-screw is placed in the underside of the cutter to be used as an adjustment. This permits using up all but a very small scrap of the steel. Of course the drill shank must be thoroughly hardened for this use.



A Lathe Bell Center for Turning Tubing

A cone-shaped tailstock center, or "dead center," which is very useful for turning tubing in a lathe can be made as shown in the sketch. The spindle is made of machine steel, or cold-rolled shafting; the cone, which revolves with the tubing, may be made of cast iron. The shank should be turned to the proper taper to fit the tailstock; the cylindrical portion may be slightly smaller, for most work. For durability, a phosphor-bronze washer may be provided to take the thrust, and a bushing of the same material, or of babbitt, may be used. The conical surface should then be turned down with an inclined angle of about 90°,

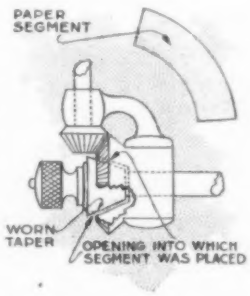


The Cone on the Bell Center Rotates with the Tubing, Holding It Firmly Centered

as shown. The finishing cut, at least, should be taken with the cone revolving upon the spindle as it would when in use. The bushing and washer may, of course, be omitted in a center which is intended for temporary use only. In using the center, plenty of oil should be provided, both in the oil hole and on the thrust washer, which may have an oil groove cut across its face.

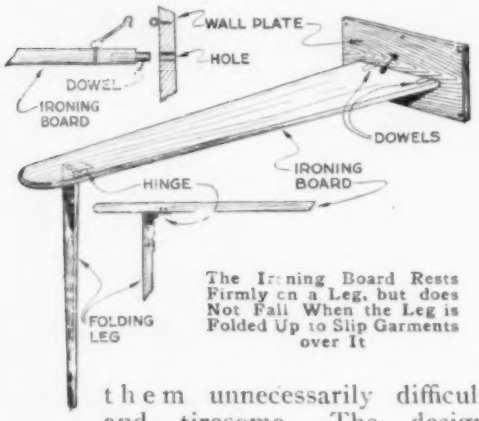
Paper Shim Makes Worn Taper Grip Tightly

When tapers in friction grips, and similar machinery, are so badly worn that they strike at the end instead of gripping, they may be used by inserting a paper shim. The paper may be cut from any at hand, and the general shape will be as illustrated. Cutting the shim to the exact shape is a not difficult geometrical problem, but takes more time than is necessary; the shape can be guessed at close enough after a few trials.—Joe W. Romig, Allentown, Pa.



An Ironing Board with Novel Features

Most of the portable ironing boards are insecure. This renders working on



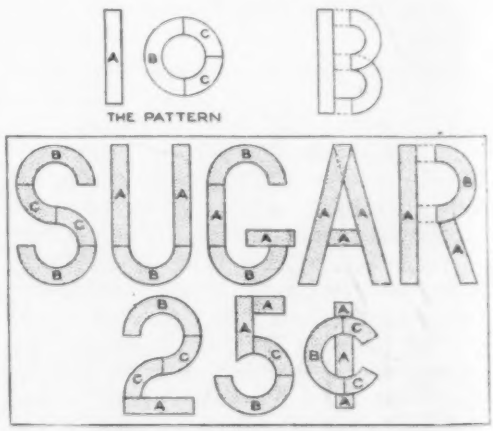
The Ironing Board Rests Firmly on a Leg, but does Not Fall When the Leg is Folded Up to Slip Garments over It

them unnecessarily difficult and tiresome. The design detailed in the accompanying illustration shows a convenient board and furthermore incorporates features of portability and adaptability. It can be taken down and stored away in a small space. When a waist or skirt is being ironed the hinged leg may be folded up along the ironing board until the garment is drawn on the board, when the leg falls back automatically to its normal location. The dimensions may vary, but experience has shown the following to be good proportions: Make the ironing board from a 2 by 12-in. plank, 4 ft. long. Taper it down to a width of 6 in. at one end. Any convenient 2 by 4-in. stick will serve as a leg. Fasten the leg about 6 in. from the small end of the ironing board with a metal hinge or a piece of leather. For a wall plate a piece of 1 by 8 by 24-in. stock is employed. To accommodate the dowels, bore two ½-in. holes through the wall plate and into the end of the ironing board. Into each of the holes in the end of the board drive a ½ by 4-in. round iron pin. Ream the holes in the wall plate so that these dowel pins will slip into them readily. Provide a screw hook and eye to prevent the board from falling when garments are being drawn over the end, and to keep the board solidly against the wall. The wall plate should be fastened, with flat-head wood screws, to the wall of the room at the location where the board is used.—James Reid, Lumsden, Canada.

How to Make Good Signs without Special Skill

By means of three patterns cut from pasteboard, almost anyone can make good-looking signs. The height of the letters must first be decided upon, and patterns made to suit. The first is a strip, a little longer than the height of the letters, and having a width about ⅛ of this height. The other two patterns are made from a circular ring, whose outside diameter is one-half of the height of letters, and whose width is the same as the width of the strip. The circle is cut into three pieces as shown.

How these patterns are combined to form letters is shown in the illustration. The outline is drawn around the pattern in pencil, and may be filled in afterward with a brush and ink. On a few letters, such as R, short strokes may well be made freehand; this will soon come easy. With the exception of "I," "M," and "W," all letters may be made of equal width, and if desired,



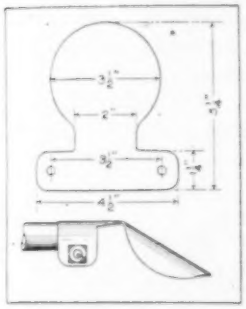
Letters for Signs are Readily Formed from Three Patterns Cut Out of Pasteboard

the spaces between all letters may be made equal. Much better appearance

will result, however, if spaces at the side of letters like "U" are made wider, and those beside "A" and "V" narrower, so that the area between letters is roughly equal.—Thomas F. Maher, New York, N. Y.

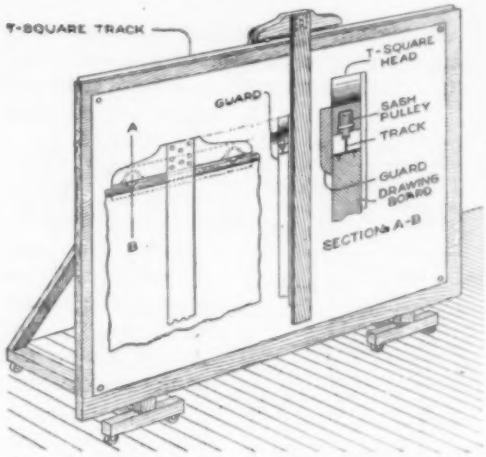
Exhaust Deflectors Keep Fumes Out of Automobiles

Motorists who are troubled by having noxious exhaust vapors eddy back into the tonneaus of their machines will find instant relief in the simple deflector illustrated. It is made from any heavy sheet metal, cut to the size and bent into the shape shown. The end which is bent to form a clamp is slipped over the tail pipe of the exhaust and bolted. The other end is then bent downward and serves to deflect the gases so they are carried away by the draft under the car.—R. O. Helwig, Chicago, Ill.



Easy-Running T-Square for Vertical Boards

Large drawings are best handled on vertical boards. Much of the difficulty often experienced in using them can be eliminated by the use of the traveling T-square mounted on a track. Ordinary window-sash pulleys may be used, but specially turned pulleys are better for accuracy. They should be heavy in proportion to the rest of the apparatus, as otherwise the straightedge part of the square may turn up at an angle when pushed instead of moving along horizontally. The track should be made of sheet steel, heavy enough to preserve the straightness of its edge, which should be carefully trued up with a file after mounting on the board. A guard is attached to the back of the T-square head, to prevent any likelihood of the pulleys being accidentally pushed off the track.

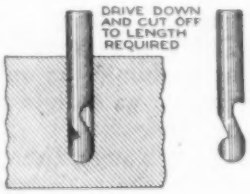


Mounting the T-Square on Rollers Is of Great Assistance in Drawing on Blackboards or Large Vertical Boards

If well built, the arrangement obviates the necessity of triangles for rectangular drawing, as horizontal lines can be drawn by holding the pencil at the proper point against the square and rolling it along.—C. C. Spreen, Flint, Michigan.

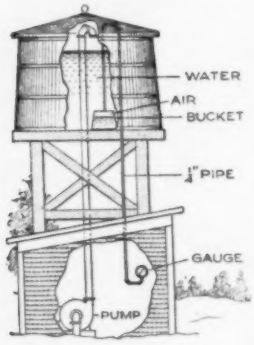
Fitting Pins Tightly in Oversize Holes

When a pin must be made tight in a blind hole, and this is a trifle larger in diameter than the pin, it is quite a problem to make the pin hold. It may be done by flattening the pin with a hammer, or sometimes by wrapping a piece of very thin sheet steel around the pin—this being a very bunglesome way. The illustration shows how it may be done so as to hold firmly, and show no external evidence that there is a "bad fit." The method is merely to file two large notches in the pin, in about the position shown, and then drive it in tight. The pin takes hold like an expansion bolt.—Joe Cowles, Columbus, Ind.



Gauge Tells Height of Water in Elevated Tank

A pressure gauge forms a very convenient height gauge for a water tank, if properly arranged. When the tank is elevated, and the gauge is to be located some distance below it, care must be taken that the gauge does not show the pressure due to the height of the tank above the gauge, in addition to the pressure due to the actual height of water in the tank.



Whenever there is a pipe full of water leading down from the tank, its weight will read on the gauge, which must be of sufficient capacity to indicate the increased pressure, and the actual height of water in the tank does not, in such a case, show with sufficient clearness.

The method shown enables one to use a low-reading gauge, which will read zero when the tank is empty, and indicate pressures which are exactly proportional to the height of water in the tank.

A water-tight pail is inverted in the tank, with a small pipe leading upward from it, over the edge of the tank, and down to the pressure gauge. The pail is nailed down, but a small hole should be made in it near the rim, so as to allow the water to flow in and out.

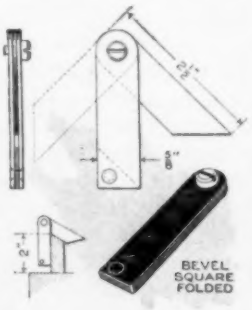
The gauge thus connected will indicate the air pressure in the pail, or .432? lb. for each foot of water height in the tank, above the level in the bucket—which is so near the bottom of the tank that it may be considered as being at the bottom. The gauge dial may be marked to read in feet, or the marks for pounds of pressure will each indicate .432? times as many feet as the number of pounds.—Henry R. Helander, Nesconset, N. Y.

An Emergency Handle for the Screwdriver

Needing a long, thin screwdriver handle on a holiday when it was impossible to procure one, I took a piece of drill rod of the required length, and hardened and ground the end. I then cut 3 or 4 in. of thread on the upper end and screwed down a nut until it was firm. Tapping enough copper rivets to fill ½ in. of the shaft, I used faucet washers for the balance of the handle. These were screwed on with a little glue and finished off with a nut and washer, after which the end was burred slightly to hold them tight. After tapping off the faucet washers I had a strong, neat, and serviceable screwdriver that had taken but a few minutes to make.—Charles H. Crawford, New York, N. Y.

A Small Bevel Square Made from Sheet Steel

Try-squares are made down to very small sizes, but small bevels are hard to obtain, though they are often badly needed. The narrow square-edged work can usually be simply laid down on the bench, and need only be held by a stop in front. In bevel work, however, it is often necessary to clamp, or tack, the stock down firmly to the bench if it is too long and narrow to be held in the vise. In such work it is particularly inconvenient to remove the work to try it with an ordinary T-bevel.



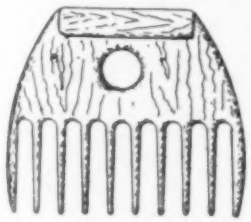
The little tool illustrated here will be found useful to every carpenter, as in addition to being a valuable help on the bench, it will also do work in corners, narrow openings, and other places where the ordinary bevel cannot be used. The tool is made from

three strips of No. 16 gauge sheet steel, each 2½ in. long and ⅝ in. wide. They are all squared on one end, and made semicircular on the other, as shown. The screw hole is drilled through two of the strips for a sliding fit to an 8-32 or 10-32 machine screw, and through the other of the proper size to take a tap. The square corner of the center strip, or blade, should be sawed off at an angle of 45°, and riveted between the other two strips, as shown. The blade is then assembled to the frame, whereupon both the blade and the frame should be trued up with a fine file.

The tool folds into a flat strip, about 3/16 in. thick, and is so light that it may be carried in the pocket all day without inconvenience.

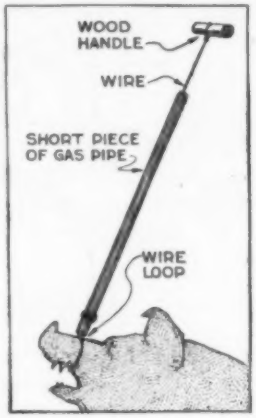
Comb for Gooseberry Picking Saves Time and Fingers

This gooseberry picker and a pair of thick buckskin gloves will save much time. The comb is made from a piece of tough hickory, or other close-grained hard wood, 6 in. square and ⅜ or ½ in. thick. One edge is divided evenly into 10 teeth, cut 2½ in. deep, and filed smooth with a 6-in. half-round wood file. Two cleats on opposite sides are fitted across the top and riveted with soft copper rivets, for a handle. This reinforced top should be about 1½ in. thick when finished. A thumb hole, made with a ¾-in. auger bit having sharp cutting lips, is bored 2 in. down from the top. It is better to bore from both sides, to make a smooth hole and to avoid danger of splitting. The edges around the hole should be well smoothed off with a knife. Finish with fine sandpaper. A low open box is needed to catch the gooseberries as they are combed from the branches of the bushes.—Herbert A. Shearer, Dayton, Ohio.



Snout Snare Makes It Easy to Ring Hogs

With a piece of old pipe and a loop of wire, one can handle the most vicious hog, prevent it from biting, and easily ring the animal. One end of the wire is firmly bound around a piece of broom handle. The wire is passed through a gas pipe and bent into a loop. This loop is caught on the upper jaw of the animal, and held taut against the gas pipe by means of the handle. The device may also be used for the purpose of snaring chickens by catching their legs in the loop.



Acetylene Manifold Heater Starts Cold Auto Engines

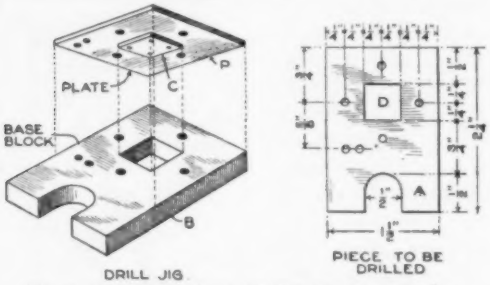
A small acetylene torch, connected with the gas tank used for lighting, will warm up the intake manifold quickly for cold-weather starting. The hose and torch can be carried in the tool box.—Sherman S. Garrett, Champaign, Ill.

Alteration Adapts Twist Drill for Soft Metals

To modify a twist drill so that it can be used satisfactorily for drilling brass or bronze, it is merely necessary to grind off on an emery wheel the lips, or cutting edges, as shown in the sketch. This operation tends to prevent the drill from digging or tearing the hole and thereby spoiling the material.—Clifford C. Raymond.

Drill Jig for Formed Flat Pieces

A number of thin flat pieces, shown in detail at A, were to be drilled. At the left of the diagram is reproduced the drilling jig whereby the holes were



Parts and Dimensions of Jig Constructed for Drilling Thin, Flat Pieces

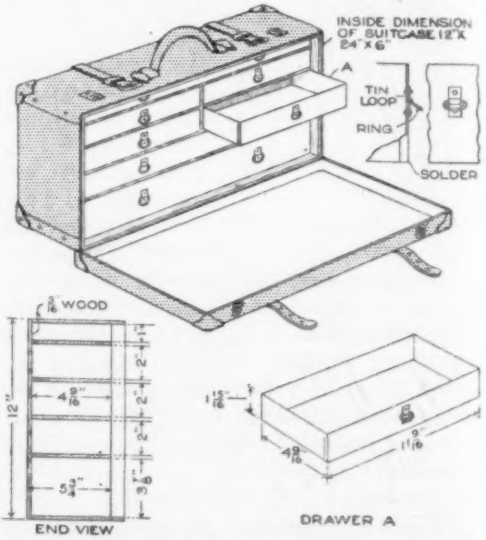
drilled accurately in the locations specified. The drilling was done as follows: The piece A was laid on the base block B which rested on the table of a drill press. The plate P was placed over them. The square boss C, riveted to the lower surface of the plate, served to center the piece accurately between the plate and the base block. The drill was forced successively through each of the template holes in the plate. For the plate P, a flat piece of machine steel, $\frac{3}{16}$ in. thick by $1\frac{1}{2}$ in. square, was utilized. The boss C was finished to make a good fit in the square opening machined in the base block to receive it. After the drill holes had been laid out and drilled in the jig it was casehardened, which tends to prevent enlargement of the holes due to wear. When drilling the pieces, one drill is first used to locate all the holes. Then such holes as are to be of a greater diameter can be drilled out to the larger size in a subsequent operation.

Bending Conduit Easily at the Workbench

Bore holes in the top of the workbench to accommodate conduit of the sizes handled. About $\frac{1}{16}$-in. diametrical clearance should be allowed. To bend the tube, insert it in the proper hole to the point where the bend is to come, and pull on the free end. Pipes up to and including $1\frac{1}{2}$-in. diameter can be bent cold. Larger conduits should be heated before bending.

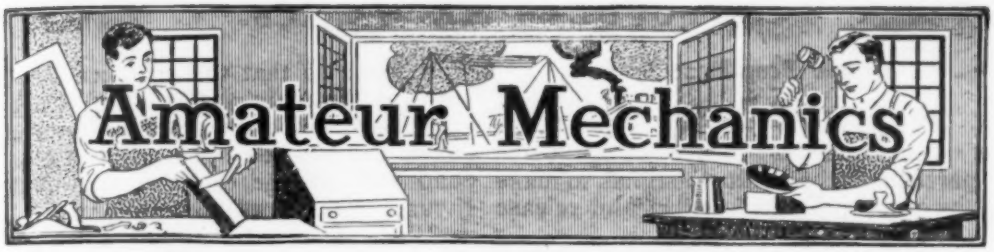
Mechanic's Tool Case Made from a Suitcase

If the mechanic happens to have an old suitcase, he can convert it into a tool case that will answer as well as a case bought at from $7 to $10. A drawer frame, or insert, is made of $\frac{3}{16}$-in. white wood, divided and joined as shown in the sketch. The frame is fastened in the suitcase by four small screws and flat nuts, or by copper rivets. The drawers are made of XX heavy sheet tin, soldered. A light ring is clamped and riveted to the front center of each container. The top compartment is for plans, data, delicate instruments, etc. The heavy tools are placed in the bottom compartment, and those above are for miscellaneous tools, nuts, bolts, small parts, etc. One of the compartments might be reserved for lunch. This case is very handily laid out, and should prove very serviceable to mechanics who have to travel to emergency re-



This Tool Case, Made from an Old Suitcase, Provides a "Place for Everything and Everything in Its Place"

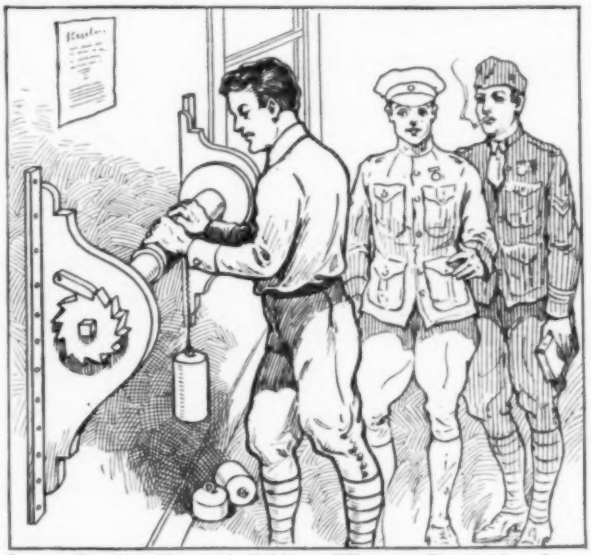
pair jobs, and other work.—P. P. Avery, Garfield, N. J.



Exerciser for Crippled Hands

By G. H. FINCH

THE war has brought forth devices great and small for bringing back to health the great majority of the wounded who are not totally disabled. In fact, one of the greatest wonders of the war is the large number of wounded now brought back to health, who in previous wars would have died in the hospitals or would have been, at best, invalids for the rest of their lives. Surgery and bacteriology, of course, have been the great factors in this result, but purely mechanical devices are doing their share as well. An example of what can be done with a simple machine is seen in this exerciser, which was built by an English amateur mechanic, in answer to a request from one of the military hospitals. It is now in service in the hospital, and giving such satisfactory service that the example may be followed in America.



In an English Hospital, Soldiers Who are Recovering from Wounds in the Hand are Provided with This Exerciser to Help Restore Strength to the Hand

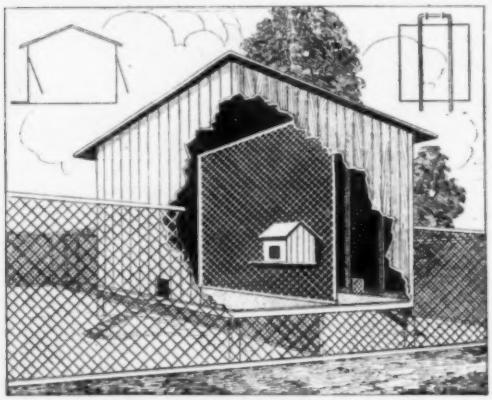
The apparatus consists, as will be seen, of a spindle of wood, turned to two or three different sizes to fit the hand, and mounted on wall brackets. A chain winds around the spindle, to which weights may be attached. The ends of the spindle, outside of the brackets, are squared, and carry ratchets so that the patient can raise the weight a notch at a time and thus watch or calculate his progress. The ratchets and pawls on the two ends are built in opposite directions, so that when the one is in use, the pawl on the other end is thrown back out of engagement. As the soldier stands in the picture, he is exercising his hands by turning the spindle toward himself, the chain winding up on the side of the spindle next the wall. When he wishes to reverse the action, he uses the ratchet and pawl on the other end.

The spindle may be covered with soft leather to improve the grip of the hands, and weights up to about 15 lb. will be found useful. The patient should of course begin by using lighter weights, and "work up" to the ability to use the heavy ones.

¶ Phonograph records may be cleaned by revolving them, face downward, on the felt pad of the revolving table.

Simple Trap-Nest System for Poultry

Most trap nests are wanting in one particular: the poultryman has to make the rounds every so often and release



Hens Which have Laid during the Day Keep Themselves Separate from Those Which have Not

the laying hens inclosed in them, in order to read their band number and reset the nest. The following device will be found to overcome this annoyance to a great extent. It is easily constructed and cared for, and affords an efficient method of picking out the good layers of the flock.

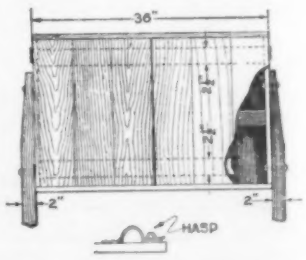
Build a block of nests of the desired number, like the one shown in the drawing. They can be built separately, or may be formed by partitions in a single long box. Cut a door or opening in each end of the nest, as indicated, and have the sill at least 3 in. above the bottom of the nest; this will keep the straw or other nest material from falling out. Suspend a wire, shaped like an inverted "U," in each opening by means of staples or hooks. The lower ends of the wires should come below the sill so they will not swing through. The wires in the entrance swing inward, while the wires in the other side of the nest swing outward. Make the distance between the arms of the "U" one-third the width of the openings. Thus the "U" will act as a gate, through which a hen of normal size cannot pass in the wrong direction. Set the nests in a position in the house so that the entrance side is toward the main yard. Then build a partition around the nests with poultry wire, and provide openings into a second yard on the opposite side of the house. Divide off the two yards by netting, and rig up a gate, or two, so one yard may be opened into the other.

A hen that wishes to lay will push up the entrance gate, enter the nest, lay her egg, and leave the nest through the exit side, not being able to pass back through the entrance. This brings her into the second portion of the house, where she either stays or passes out into the second yard provided for that purpose. At night, the owner makes a record of all hens in the second yard, these being the ones which have laid during the day. They are then let back into the main yard, where they join the flock for the night.

Feed and water should, of course, be provided in the exit part of the house and yard.—L. B. Robbins, Harwich, Massachusetts.

Skate Locker Keeps Skates Safe and Convenient

It is often a great convenience to be able to leave the skates at the pond, river, or rink, safely guarded against theft. The locker here illustrated makes this quite easy. It is simply a cabinet, or box, with heavy hinged doors, fastened with strong hinges to the supports, which may be driven into the sand or mud before it freezes. The feature of the device, however, is the hasps, one for each skate to be accommodated, which are fastened securely to the inside of the doors. The semicircular part is passed through the opening in the skate blade, and fastened with a padlock, each person furnishing his own lock. If well built,



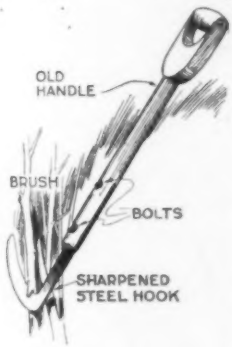
robbery of the locker would be a troublesome job.—Elmer Tetzlaff, East DePere, Wis.

Reflected Light as an Aid in Cooking

Use a looking-glass to light up the utensils on the kitchen range when it is impossible to get good natural or artificial light over the range. An 8 by 10-in. mirror will serve to reflect light into the pots and kettles, avoiding the risk and cost of using matches.—Thomas Peterson, Brooklyn, N. Y.

Handy Brush Hook Made from Scrap Materials

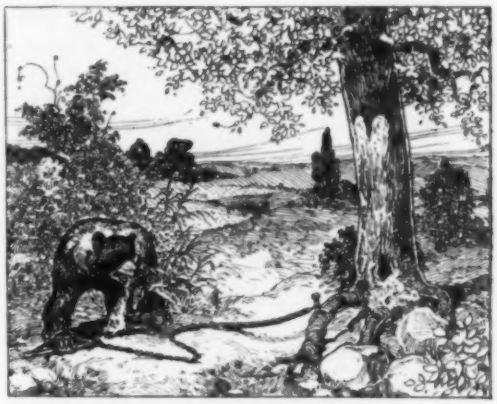
An old spade handle, a piece of 1-in. stock steel, ¼ in. thick, and two bolts are all that is needed to make an excellent brush knife. The steel is fashioned in a forge, and on an anvil and grindstone, into the shape shown. It is then securely attached to the handle which has been previously trimmed and provided with holes for the bolts.—H. V. Stanton, Cleveland, Ohio.



Trap Chains Provided with Springs Prevent Escape of Animals

Trappers operating in the mountains of southern California discovered that many valuable fur-bearing animals escaped from their traps because the rigidity of the anchor chains tore off their feet when struggling to free themselves. This difficulty was overcome by mounting a coil spring in the anchor chain, as shown in the accompanying sketch.

With this type of anchorage the animal in struggling to free himself from the trap does not get the jerks that result from the ordinary anchor chain. The jerks are softened by the resilience of the spring, and as the end of the chain is reached, the trap is drawn back gradually. One trapper who has tried this system says that he has not lost a single animal since adopting it; formerly about 10 per cent of his catch escaped.—John Edwin Hogg, Alhambra, Calif.



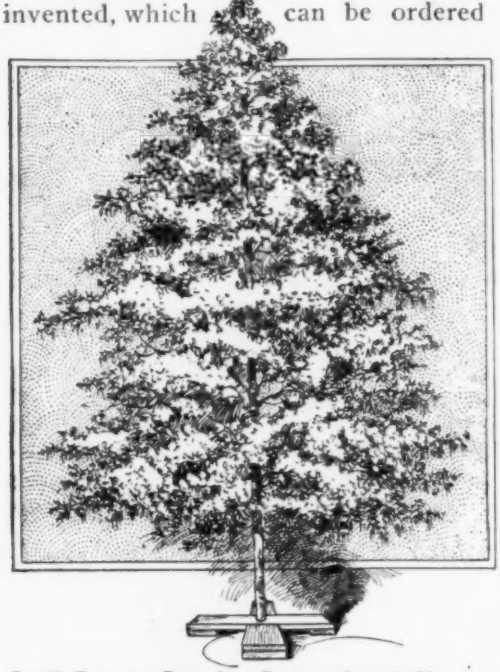
A Spring in the Chain of a Trap Prevents the Game from Jerking Loose

Large Sea Shell Makes a Pretty Fernery

A fair-sized sea shell, such as is often picked up along the beach, makes a quaint and artistic appearance when filled with soil in which ferns are growing. Only the smaller ferns can be used, but if they are arranged in a free and seemingly unstudied manner, the effect will be very pleasing. A light soil should be used, as a heavy soil will not retain moisture well enough; a sandy loam to which has been added one-third the quantity of leaf mold or well-rotted manure is good for the purpose. If the shell is well selected and is well cleaned and polished, the contrast between the shell color and the green of the ferns is quite beautiful.—C. L. Meller, Fargo, N. D.

Trees Preserved by Frosting for Christmas Trees

The hampering conditions of war will cause a great shortage of Christmas trees this year. Many artificial Christmas trees have been invented, which can be ordered



Small Trees or Branches, Preserved with Alum or Paraffin, Make a Splendid Substitute for the Pine as Christmas Trees

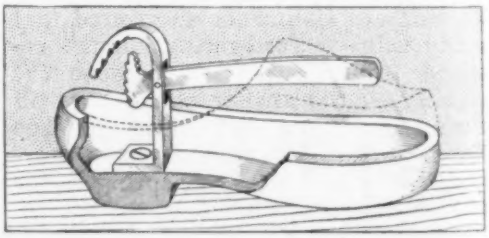
months before and kept in stock. Most of them can be kept from year to year and brought out each Christmas, looking almost as fresh as when first used, but few have the symmetrical beauty of the original growths.

However, there is no need to resort to artificial Christmas trees this or any other year, if one takes a little forethought and prepares for the occasion well in advance. A small tree or branch can be cut at any time, either a pine or any other suitable kind. As soon as possible after taking it home, melt enough alum crystals in a basin to cover the leaves, trunk, and branches. The tree should be dipped in the alum, and removed quickly. The alum closes all the pores of the tree and leaves, forming a thin film on the outside. Where it drips down in small pendant shapes it gives the effect of snow or ice, adding greatly to the beauty of the tree. When the alum hardens, it hermetically seals leaves, branches, and trunk, so that they will retain their green, fresh appearance indefinitely. Paraffin wax can be used instead of alum for frosting, but the effect is not quite so attractive. In either case the same tub of solution can be used over and over again for different trees until most of it has been exhausted.

Spraying the melted alum or paraffin on the trees is another way of treating them, but a copper sprayer must be used, heated so the material will not harden in it. Trees too large for dipping can thus be treated. For spraying, the tree should be slightly warmed in advance, and the spraying should be done in a hot room or over a kitchen stove, so that the solution will not dry before it adheres to the leaves and branches.—George E. Walsh, New York, N. Y.

Novel Combination Nut Bowl and Cracker

Novelty, simplicity, and utility are combined in the nutcracker illustrated. The bowl is made from a big Dutch wooden shoe, by cutting off the top part. The thick heel makes a splendid place for fastening the big wood screw which fastens the nutcracker to the bowl. The cracker is made from two iron bars, the lever being pivoted in the curved bar with a bolt or riveted pin. In making the slot, care must be



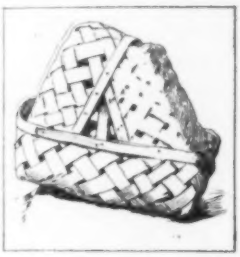
A Dutch Wooden Shoe and Two Scrap-Iron Bars Make a Novel and Useful Nutcracker

taken to leave plenty of metal at the sides for strength to resist the power-

ful pressure the long lever can exert. Iron used for the curved piece should be at least ⅜ by 1¼ in.; the lever may be 3/16 or ¼ in. thick. The cracker may be nickelplated all over before attaching to the bowl.—H. Rousset, Washington, D. C.

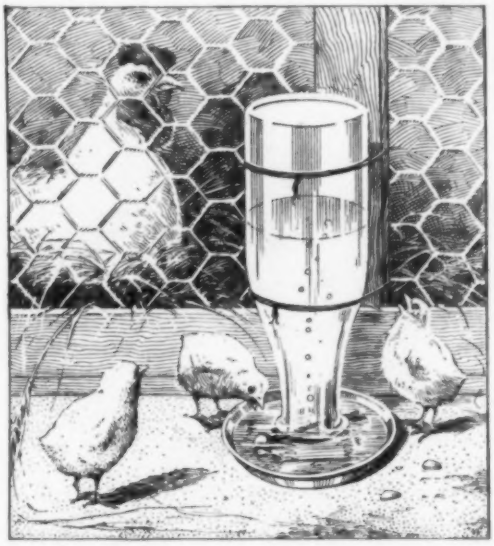
How to Make Use of Market Baskets

The arrangement of market baskets indicated in the sketch served as an emergency coop while getting the frying pan ready for the pigeon. The coop is self-locking, but, of course, affords no protection against raiders. The springiness of market baskets can also be used in other ways. One householder uses a basket weighted with a brick to prevent a door from slamming while swinging open in a wind. The brick keeps the basket in its position on the floor, and the basket breaks the shock of the swinging door. The basket is more resilient than the rubber tip of the ordinary doorstop. A heavy load is carried more easily in a basket than in the hands, even though the bundle has a good carrier or handle. Covered with burlap, or canvas, to prevent scratching, an empty basket is a useful fender to protect a small boat lying alongside a dock or pier.—Ben Frantzreb, Indianapolis, Ind.



Chicken Drinking Fountain Made from Milk Bottle

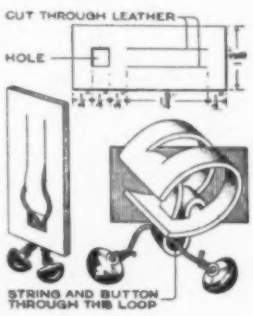
A very simple but satisfactory drinking fountain for the chickens can be made by inverting a milk bottle, tying or wiring it to some upright support, and letting the mouth of the bottle rest on a nail laid in a pan. The bottle may be removed from the wires for filling, and a piece of paper placed over the mouth until it is in place. When the paper is removed, water will flow out until the mouth of the bottle is under water, after which no more will flow until some of the water has been removed from the pan.—Herbert A. Shearer, Chicago, Ill.



A Milk Bottle Inverted in a Pan Forms an Extremely Simple but Useful Drinking Fountain for Chickens

Leather and Button Puzzle

In a piece of leather, 1⅜ by 2¾ in., cut a ¼-in. square hole, ¼ in. from the end. In line with the sides of the hole, cut two slits in the leather, as shown. Arrange a piece of fine string, or strong thread, as shown at the left, and tie two shoe buttons to its ends, or any buttons too large to pass through the ¼-in. hole. The puzzle is to take the string with buttons on it out of the leather strip entirely; it can easily be accomplished if the strip of leather between the two slits is pulled through the hole.—Harry Marshall, Seattle, Washington.



Drain for Cement Steer Yard Conserves Fertilizer

The photograph shows a concreted yard where steers are kept during the winter. Fresh straw is placed in the yard each day for bedding; the manure

By Means of a Drain and a Pit, the Liquid Manure is Conserved for Use in the Spring

is allowed to accumulate until spring, thus having time to decompose properly before placing it on the fields. To keep the yard dry, the liquid is drained into a concrete pit located just outside the yard, by means of a drain located in the center of the yard, to which the whole surface slopes. The drain is made of 10-in. glazed sewer tile, laid underground. The pit outside the yard is provided with a manhole, through which the liquid is pumped into a tank wagon, when a field is to be fertilized. A sprayer is used for this, such as is mounted on street-sprinkling wagons.

Converting a Safe-Cabinet into a Safe

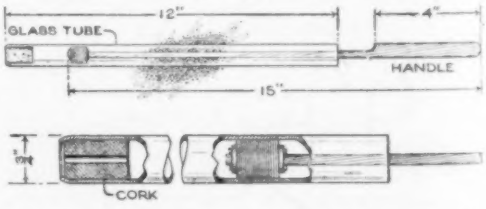
An office manager, using fireproof filing cabinets, conceived the idea of converting the cabinets into temporary safes for valuables. This was accomplished with iron bars corresponding in length to the height of the cabinets. The bars are dropped through the handles on the drawers, the lower ends being held in position by brackets riveted to the lower part of the cabinets. The upper end of each bar is secured by a padlock and a padlock hinge, riveted to the top of the cabinet. The arrangement is very easily made and affords the security required.—Charles I. Reid, Washington, D. C.

Bricks Soaked in Kerosene Used as Fuel

A common building brick thoroughly soaked in kerosene oil, makes good fuel. Such a brick, placed in a stove, will burn for several hours and give excellent heat. When the oil has burned out another freshly saturated one is put in. The bricks should not be recharged with oil until they have become cold. Otherwise there would be waste of oil through evaporation. Five gallons of oil burned in this manner are equivalent to about 6 cu. ft. of wood, or very nearly one-twentieth of a cord.

Spray Gun Easily Made from Glass Tube

An old boiler gauge glass will give good service as a gun for spraying disinfectants, insect killers, etc., if fitted with a handle and two corks. One cork has a small hole through it which may be most easily made by thrusting a red-hot wire through the cork. One end of the tube should have the edges turned in slightly, by revolving carefully in a blue gas flame until it becomes red-hot. After the tube has cooled, insert the cork from the other end, and seat it firmly against the bent-in edges of the tube. Use the other cork as a piston, fitting it with a long rod as a handle. The liquid is sucked into the tube by dipping the lower end



A Piece of Heavy Glass Tubing Makes a Handy Spray Gun for Plants, or for Disinfecting

in it, and pulling out the piston, and is discharged by pushing in the piston.

Papier-Mâché Forms, and How They are Made

By HARRY MARCELLE

PAPIER-MACHE forms, busts, medallions, etc., are of great value to window trimmers, decorators, and display artists. Often the lack of such accessories ruins many an otherwise perfect display. Almost any article that can be cast in plaster can be made of papier-mâché, and will be lighter and more durable. It can be finished to represent wood, metal, plaster, etc., and to harmonize with any color scheme.

Articles made in this manner are not difficult to produce. To illustrate, take a medallion or plaque, with the word "Hats" in relief, as shown in Fig. 1. An old kitchen table will be found excellent to work on, providing the top is not warped or the grain raised. The top should be given two or three coats of shellac, letting each coat dry before applying the second.

The design described is 18 in. in diameter and its greatest thickness about 2 in. With a piece of crayon, draw an 18-in. circle by using a nail and a piece of string. A large nail is driven in the center to be used as a guide as the work progresses. The best material for making the model is sculptors' modeling clay, which can be purchased at any artists' supply shop. This clay always remains plastic and does not require moistening as does the ordinary clay. It can be had in a variety of colors.

Several boxwood modeling tools are also required. They are not costly, and come in a variety of shapes; an assortment for the beginner can be purchased from any supply shop. The clay is kneaded and pressed firmly to the table until sufficient space is covered to a depth of at least 2 in., as shown in Fig. 2. Nail two blocks of wood to a 1 by 3-in. stick, 2 ft. long, as in Fig. 1, with which to level off the mass of clay to the height of the letters. Into another strip drill two holes, 9 in. apart, as in Fig. 2. This piece is placed over the nail in the center, and a pointed modeling tool is inserted in the other hole. A circle is cut clear through the clay, as shown in Fig. 1. The remaining clay is rolled into long strands and placed on the edges to build up for the border.

Border gauges are cut from galvanized iron, in some design such as shown

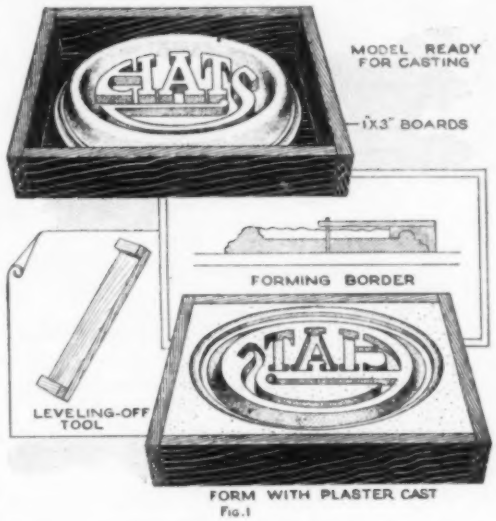


Fig. 1

Papier-Mâché is Molded in a Plaster Cast, Which is Made from a Clay Model

in Fig. 2, and nailed to a strip. The strip is pivoted on the center nail to mold the border, and is kept level. If the border contains any imperfections, these are built up with more clay and the process repeated.

The design is then traced on the clay with a suitable modeling tool, holding it at an angle of about 60°, and the material is cut away until the desired depth is reached, as shown in Fig. 2. If a plain background is desired, the height of the letters can be lessened and the clay cut away until the table is reached, which then affords the ground for the cast. In the case described, however, a crosshatched ground is used, of clay, ¾ in. thick.

When the model is ready for casting, a form of 1 by 3-in. lumber is made, to surround it, as shown in Fig. 1, and the ends are nailed. Clay is placed about the bottom edge where the form rests on the table, to prevent the plaster from flowing out. Strips are placed

inside the form at the top to help strengthen the finished case, as shown by the dotted lines in Fig. 2. The entire model is given a coat of olive or

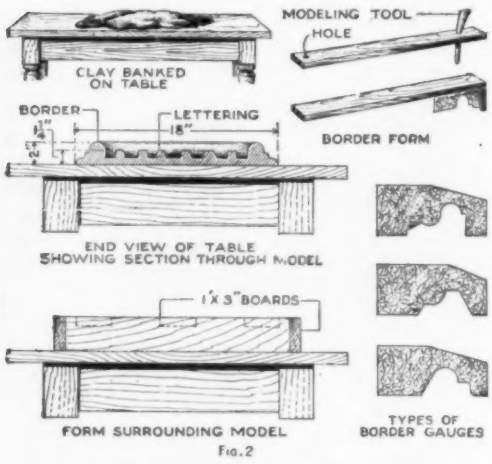


Fig. 2

Methods, Tools, and Suggested Dimensions for the Modeling Work

sweet oil, to prevent the clay from adhering to the plaster.

To prepare the mold, a large porcelain dish is filled with water. Into it is sprinkled plaster of Paris, until the mass begins to thicken, when it is taken and splashed into each crevice of the model, covering the entire space inside the form to prevent air bubbles in the plaster. Before the second layer of plaster is applied, small narrow strips of burlap are cut and placed in opposite directions over the first layer of plaster; several pieces can also be wrapped around the braces. Another batch of plaster is then made, adding a small quantity of dry color to the water to tint the plaster. After being mixed, it is applied in the same manner as the first layer, a thin coating covering each piece of burlap, also up to and around the braces, where the plaster can be thrown on in a heavy mass. The braces prevent the waste of plaster, and, with the burlap, help strengthen the cast. If the burlap and the braces are discarded, the entire form will have to be filled with plaster, which not only consumes more material but makes the cast very heavy.

After sufficient time has been given the plaster to set, the cast is lifted from the table and set on its end. The clay is carefully taken from it by aid of the modeling tools until not a particle remains, and it is left to dry or season. Figure 1 shows the model with the form surrounding it, ready for casting after the braces are placed.

The finished casting is shown at the bottom of Fig. 1, with the clay removed. After the casting has become dry, several thin coats of shellac are applied to the entire face of the cast, and left to dry.

As raw material for the papier-mâché, purchase a roll of red rosin building paper, and tear it into strips about 8 or 10 in.; soak these in a barrel of water. This paper comes in different grades; the heaviest, or three-ply, is best, as it is more porous and pliable. By no means cut the paper, as the ragged edge caused by tearing makes a neater lap in molding the paper. Paper left to soak over night will be found easier to mold. A heavy paste is made by adding water to rye flour, stirring it continually until it is free from lumps, after which it is cooked on a fire to a smooth paste. The paper is then taken from the barrel and placed on a board to drain. The paste is rubbed into each side of the paper, which is then crumpled into a ball and left to soak for a few minutes.

The cast is laid flat on the table, and given a coat of oil before applying the paper. Each ball is unfolded and straightened out on the table. The pieces are taken separately and laid upon the cast, pressing the paper well into the corners with the fingers. The next piece is allowed to lap over the first piece, and so on until the entire cast is filled, letting the paper extend several inches over the edge of the cast. Four or five layers are applied in this manner, care being taken to press each piece into the crevices of the cast. Several additional layers are placed around the outside of the form to give it body. The cast is then laid away to dry or placed in the oven described below. The oven should not become

too hot, or the paper will warp in drying, making it useless. When it begins to turn up or part from the casting on its edges, it is removed from the oven and carefully drawn from the cast. The same process is repeated until the required number of forms are made. The edge is then trimmed with a pair of heavy shears, and a 2-in. strip of unbleached muslin pasted to it. Under no consideration use glue, which has a tendency to crack or chip the paper. If any paste remains after the forms are finished, it can be kept from souring by the addition of a few drops of carbolic acid.

When the binding is dry, the forms are coated with the following mixture, known as sizing or priming: In a half pail of water dissolve ½ oz. of powdered alum; then add bolted or Paris whiting (this is not plaster of Paris), until it becomes of the consistency of cream, when a half pint of hot glue is added, and stirred thoroughly. Quite a difference is found in the various grades of glue on the market, and the sizing must be tested before being applied to the forms by painting a piece of dry paper with the mixture, which will rub up when dry if sufficient glue has not been added. A bleached, or white, glue should be used, so that it will not change the color of the sizing.

If a number of identical products are required, an oven will be required to hasten the drying of the paper forms. A dry-goods box, of sufficient size to admit the casts, is lined with sheet asbestos, as shown in Fig. 3. A door, which is similarly covered, is made to fit the box. A small gas hot plate, such as can be purchased in the five and ten-cent stores, furnishes the heat; it can be attached to any gas jet by using a length of rubber tubing or pipe. A number of holes are drilled at the base of the box to admit air, and strips are nailed to the sides of the box to hold the casts.

After forms have been dried, they are ready for the final coat or finish. A number of finishes are here described. Oil colors are the most durable. Those known as colors ground in japan or gold size, and used by coach painters, are preferred, as they dry quickly and without a gloss. Turpentine is the only medium required for

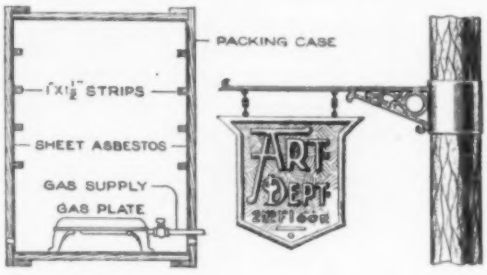


Fig. 3

Oven Used for Baking the Products; Also a Suggestion for the Interior of a Store

thinning. For inside purposes water, or distemper, colors can be used, and are prepared like the sizing, omitting the powdered alum, as the sizing contains sufficient to harden the form.

Polished Steel: This finish is obtained by giving the form a coat of lead color. When dry, a coat of japan gold size is applied and left to become almost dry, when the aluminum powder is dusted on with a chamois skin. A coat of varnish completes the process.

Antique Bronze: In this case the form is coated with burnt umber and bronze green, dark, applied in patches. Before the color becomes dry, copper-bronze powder is carelessly thrown on the surface or worked on with a dry brush, letting the green and brown penetrate in places. This is also varnished when dry.

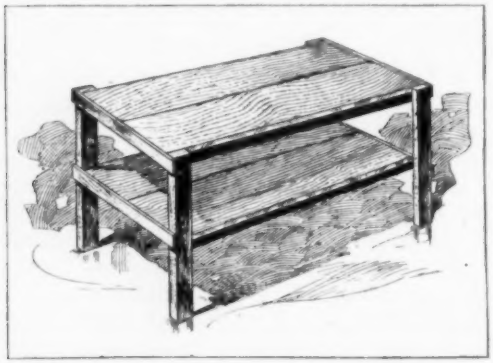
Old, or Burnt, Ivory: A coat of cream color (white with a little chrome yellow, medium, added) is applied to the form. When this is dry, raw sienna and yellow ocher, mixed half and half, are applied to the sides and border of the form. Before they have had time to become dry, the surplus is removed by rubbing with a piece of soft cloth, leaving part of the color in the deep crevices of the form, which gives it a weathered appearance. This finish is not varnished, but is given a coat of wax instead.

Beautiful color effects can be pro-

duced with an air brush, spraying the color from an angle of 45°, which throws the letters in relief by shading one side. A design used in a store to direct customers to the various departments is shown at the right in Fig. 3. Busts, imitation armor, shields, vases, molding, etc., can be made in this manner, and if properly cast will withstand an unusual amount of hard use.

Spare Table Boards Make Useful Serving Table

Many dining tables are provided with more boards than are ever used,



Spare Boards for the Dining Table can be Made into a Serving Table without Injuring Them

and the extra boards are stored somewhere without serving any purpose, since one does not like to cut them in any way. The table frame shown in the illustration is so made that it stands by itself without the boards, and the boards are simply laid in without being fastened. The table is useful in the dining room, and the boards may be removed instantly if wanted for the dining table. If desired, the boards may be fastened in the small table by clamps or buttons.

Double-Thickness Belts Preferable to Single-Thickness

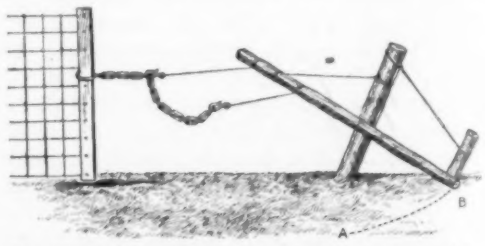
As a rule it is economy to use double-thickness belts rather than single-thickness ones. While the latter are cheaper in first cost, they stretch easily and require more frequent taking up. This involves a waste of time. The total life of the double-thickness belt is much greater.—F. J. Vogle, St. Louis, Mo.

Greasing Automobile Shaft without a Gun

On my car the motor generator is driven by a shaft with a universal joint at each end, and these require grease lubrication. Each casing had an opening closed with a ⅛-in. plug. It was impossible to fill the joints through these holes, and do a good job. I found a grease cup on the steering-rod joint which fitted these holes, and used it temporarily when greasing the joints, restoring it to the steering rod after use.—A. B. Gardner, Dowagiac, Michigan.

Wire-Fence Stretcher Has Powerful Leverage

The force which can be exerted by this stretcher is limited only by its size and strength of construction. The materials necessary are three poles or small logs, some heavy wire, a length of stout chain, and two hooks which can be purchased at any hardware store or forged from iron-bar stock. The stretcher is shown in use; the next motion will be to move the handle end of the long lever from B to A, hitch the loose hook several links forward on the chain, and stretch again by returning the handle from A to B. The leverage exerted can be made as great as desired by lengthening the lever and



The Fence can be Stretched as Tight as Desired by Means of this Simple Lever Arrangement

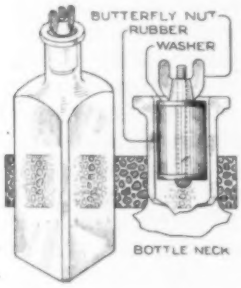
bringing the hook wires closer together.

Sun Glare Overcome by Strip on Auto Windshield

A black-enameled strip, 4½ in. wide, at the top of the windshield kills the sun glare, and also makes it easy to face a bright headlight at night. The strip does not interfere with the driver's vision. If laid on by a good painter, the strip does not offend—indeed, it adds to the appearance of the car. A gold-line strip at the botom of the black dresses it off well.—F. C. Obear, Birmingham, Ala.

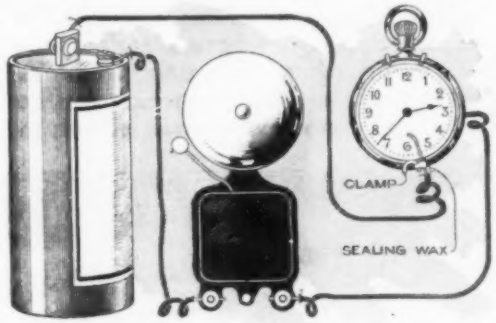
Expansion Bottle Stopper Prevents Leakage

A bottle stopper that cannot come out, or leak, under any circumstances is handy for many purposes and is especially appreciated by travelers who must carry medicine, or other liquids, in a traveling bag. Anyone can make the stopper illustrated. An ordinary perforated rubber plug is provided for the bottle, and a slender stove bolt is passed through it, with washers at both ends. A wing nut is fitted on the end of the bolt, which, when tightened, expands the stopper and seals the bottle securely.—W. P. T., Buffalo, New York.



Watch and Buzzer Make Alarm Clock

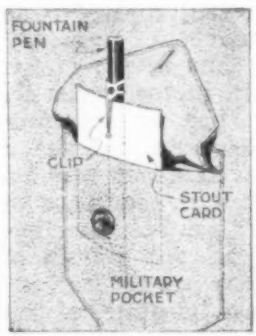
A watch with this attachment can be used as an electrical alarm clock, set to ring at any time within the ensuing 12 hours, or it is handy as a timer for cooking or other heating processes. One wire from the battery-buzzer circuit is soldered to a wire frame which fits on the watch; the other end is fastened to it with a drop of sealing wax, as shown. The glass or crystal of the watch should be removed. If intervals less than an hour are to be timed, the end of the wire may be simply bent down to touch the minute hand when it arrives at the proper point. If the hour hand is to make the contact, a piece of thin spring brass or steel should be bent so as to lie against the face of the watch, making contact only with the hour hand; the end of the strip may be curved and bent up slightly for good operation. The wire frame can be shifted around to any point on the dial as desired.—Arthur Sternberger, Paterson, N. J.



A Cheap Watch Connected to a Battery and Buzzer Makes an Accurate Timer or Alarm

Card Holds Fountain Pen Upright in Soldier's Shirt Pocket

When a soldier desires to carry a fountain pen in his shirt pocket he cannot use any of the ordinary fasteners in the usual way because regulations require that the pocket flap be buttoned shut. The difficulty may be overcome by clipping the pen to a piece of cardboard. The cardboard is then slipped into the pocket with the pen attached and serves to hold it in an upright position. An envelope will also serve the purpose.



Shooting the Kaiser in Liberty-Loan Window Display

By BERT A. SMYSER

AN important factor in the success of the three great war loans already floated has been the use of clever advertising devices, which catch the American eye where a serious appeal might often pass unnoticed. A striking window display which can be built in any store window is shown in the photograph. At the left of the window Uncle Sam stands with rifle in hand, back of a breastwork of stones or sand bags, these being painted on wood or cardboard. To the right, behind a similar fortification, the figure of the kaiser is mounted on a stick so as to rise up, point his gun at Uncle Sam, and fall down at that very moment, as his opponent's gun, similarly raised, apparently fires a shot at the helmeted figure.

An Easily Arranged Mechanical Window Display for a Liberty-Loan Campaign: As Soon as the Kaiser Raises His Rifle to Shoot, That of Uncle Sam Comes into Action and Drives the Enemy to Cover

The device is operated by a small fan motor under the floor, as shown in Fig. 1. Its motion must be geared down so that the crank inclines the lever R one way and then the other, at a rate of once or twice a minute. This is best done by means of a worm gear, but a train of wooden pulleys with round leather belts, as shown, will be quite satisfactory. It will be found necessary if this method is used, to have at least as many pulleys as are shown in the small plan view. The total reduction in speed produced by such a train of pulleys is the product of the ratios of pulley diameters; thus, if the small pulleys are 1½ in. in diameter and the large ones 15 in., the speed of the crank N will be 10×10×10, or 1,000 times slower than that of the motor, which would be about right if the motor used is running at 1,800 revolutions per minute.

The rod H, supporting the figure of the kaiser, rises from a bolt which moves in a short slot in the end of the lever R, through holes E, which guide the rod in a vertical direction. The figure is cut from wood or heavy cardboard, and suitably painted. The left arm is pivoted at the shoulder only, and the right arm at both shoulder and elbow. As the figure reaches the top of its travel, the chain tightens and pulls down the lug attached to the left shoulder, thus raising the gun. It falls almost immediately, as the rod H begins to descend, the effect being that it is due to the shot from Uncle Sam's rifle.

The figure of Uncle Sam, at the left, is mounted on a stationary rod, A, the moving rod C being attached simi-

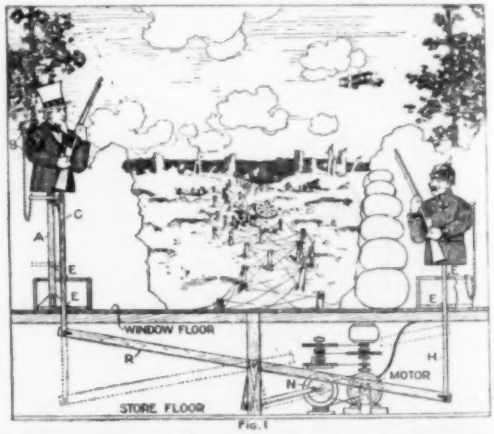


Fig. 1

The Figures are Operated by a Reciprocating Beam under the Floor, Driven by a Small Electric Motor

lar to rod H, and guided in openings E. The rod C, as it nears the bottom of its travel, pulls the lug B, attached

Fig. 2

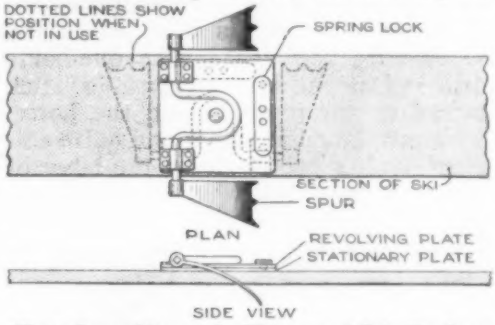
Uncle Sam's Arms are Pivoted in Such a Way That His Left Hand Slides Naturally into Position as He Raises His Rifle

to the right shoulder of the figure, which raises the gun. The mechanism for doing this may be similar to the one described for the other figure, but if a little more lifelike appearance is desired, the arrangement may be as shown in detail in Fig. 2. Here the upper half of the left arm is stationary, the lower half working on a pivot at the elbow. The fingers of the left hand appear to slide back on the gun barrel as it is raised, this effect being produced by the screw eye in the left hand sliding along on a rod attached to the gun barrel. This rod must be on the front side of the gun, but if properly camouflaged, will appear to be a part of the gun. The left arm is prevented from falling forward when the gun is raised by a cord attached to two screw eyes, one on the movable portion of the arm and one on the stationary portion. Upward movement of the gunstock is limited by a pin which is shown on the coat collar, but which can be made invisible by paint. The position to which the arms and gun fall when the chain is loosened is also determined by stops or pins. By varying the location of these pins, the length of the cord between the two screw eyes, and the length of the chain, the working of the figure may be adjusted until the effect is very realistic.

After the figures are built and adjusted, the mechanism may be covered by painted pieces of cardboard, cut and painted to represent breastworks of any design or material. The background should be a large drop or curtain with a few touches suggesting the battle field, but need not be at all elaborate, the attention of the onlooker being at once drawn to the moving figures.

Homemade Climbing Spurs Fitted on Skis

Spurs fitted to skis, so that hand poles are almost unnecessary in climbing, can be easily made, and will prove worth while for the winter sportsman. The spurs are fitted to the upper side of the ski, as shown in the sketch, and are arranged so that they slide along on the snow, on the forward step, and come into action when the foot is set for another step. When not in use, the

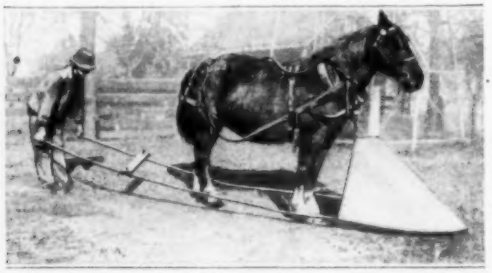


These Spurs Alternately Slide on and Grip the Snow as the Ski Runner Moves over It

spurs are set on the ski, as shown in the plan in dotted lines, by pivoting the revolving plate. A square metal plate, as shown, is fastened to the skis with screws. Pivoted on the center of this is a second plate. A small strip of metal is riveted to the upper plate, and acts as a spring lock. Small pins at the ends of the spring lock project through both plates. The spurs proper are fastened to a heavy wire and supported in two bearings, as shown.

Seeding Grain Single-Handed in Standing Corn

The common practice of farmers when seeding winter wheat or rye in

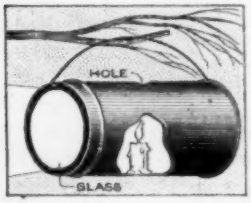


The Shield Suspended from the Horse's Collar Clears the Way for the Grain Drill, and Saves One Man's Labor

standing corn is to have a man go ahead of the horse, and with his hands turn the broken cornstalks out of the space between the rows in order to clear the way for the grain drill. One farmer, when the man who was to do this failed to show up, solved the problem by using the device shown in the photograph. It is made from two lengths of old gas pipe, the ends bent together in a curve and fastened to a 45° fitting. The shield is of tin or sheet iron, and is fastened to the pipes with hay wire. The one-horse drill is fastened to the 2 by 4-in. stick bolted to the pipes behind the horse. This arrangement was found quite efficient, and of course saved the labor of one man.

An Old Coffee Can Takes the Place of a Flash Light

This lantern answers the requirement for a safe light to use at work or play, and is a good substitute for the electric pocket flash lamp that every boy wants, yet all cannot afford. Take an empty tin can, make openings at the bottom and side for ventilation; remove the top and fit in a piece of glass, cut round. The glass can be cut with an old pair of scissors, holding the work under water while cutting. Set the candle in a drop of its own hot tallow and it will stick firmly. A wire handle looped from top to bottom makes the lantern convenient to carry.—Mrs. E. C. Lane, El Paso, Tex.

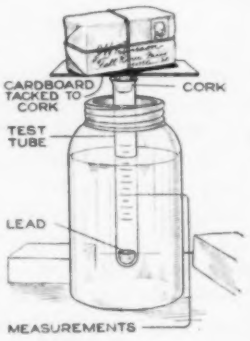


Simple Method of Saving Soap

All scraps of toilet soap are saved in a screw-top jar, partly filled with soft water. Periodically the accumulations are dissolved in hot water. A few pebbles in the jar help to dissolve the soap when the jar is shaken. A hole punched in the top makes it easy to use this liquid soap.—W. J. Parks, La Salle, Ill.

Hydraulic Postal Scales

A chemistry student has made fairly accurate hydraulic scales from a large test tube and a glass fruit jar. In the bottom of the tube was placed a piece of lead sufficient to hold the tube upright when it was set in the jar partly filled with water. A cork, to which was attached a square of cardboard, was inserted in the end of the tube, forming a pan. To calibrate the device, known weights were placed on the cardboard and the various depths to which the tube sunk were marked on its side.—Dale R. Van Horn, North Loup, Neb.



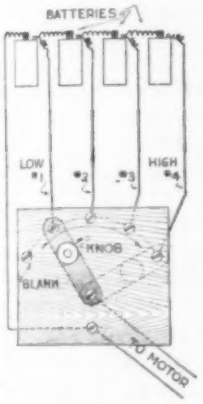
Stain for Giving Wood a Blue Color

A water and acid-proof wood stain of a brilliant shade of blue can be made by dissolving ½ oz. of water-soluble Prussian blue in 32 oz. water. The wood is immersed in this bath for

one hour, and the stain made waterproof by placing it for 30 minutes in a second bath of ordinary household hydrogen peroxide. Upon drying, the wood can be varnished to further enhance the brilliancy of the color.

Simple Controller for Battery-Driven Motor

Satisfactory results are obtained with a controller like the one illustrated herewith when it is used for regulating the flow of current to a small motor or other appliance operated by batteries. The latter are wired in the usual manner and, in addition, connections are made between their negative poles and the contact points on the board. As the controller arm—a piece of copper with a knob attached—is swung to the right from contact to contact, one battery after another is brought into the circuit. Brass screws are used for contact points and binding posts on the board.—William T. Rector, Truman, Minnesota.

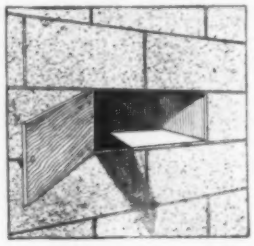


Pen-Point Receptacle Makes Good Electrical Connector

Often a small brass box, such as used for holding pen points, can be made into a connector which gives good contact for use in low-voltage circuits of several amperes. Brass screws and nuts, taken from a worn-out dry cell, and screwed into the ends of the case, provide terminals. Any enamel must of course be cleaned off the parts making contact.—Wm. Warnecke, Jr., New York, New York.

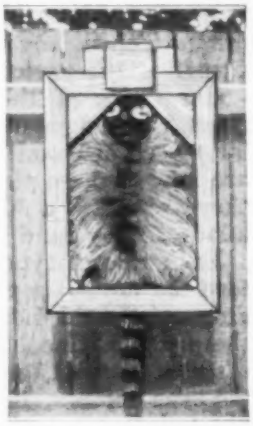
Cooling Box in Basement Wall Makes Ice Unnecessary

A box or shelf in the basement wall will keep food cool in hot weather, saving the cost of ice. A stone, or a number of bricks or small stones, is removed from the wall, and a thin sheet-metal box is inserted, with its hinged cover facing out. For best cooling properties, the space between the box and the stone should all be filled with mortar, and the lid or door should be lined with nonconducting material, such as asbestos or wood. The box should be located several feet below ground level.—Herault A. Trester, Milwaukee, Wis.



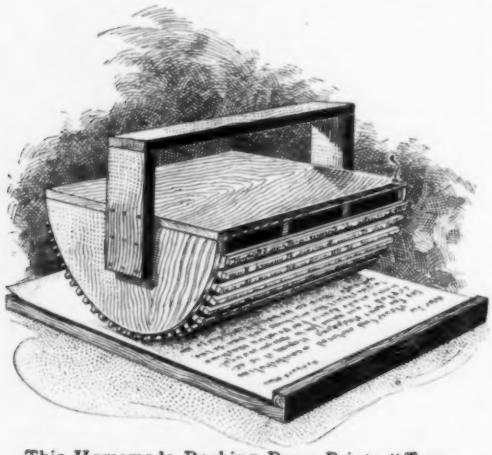
Stretcher for Small Skins Provides Ventilation

Small animal skins are usually stretched upon a solid board, or stretcher, which does not allow any ventilation on the side next to the board. Ventilation can be provided by the use of a simple rectangular frame with two triangular pieces set in the corners of the top edge. The skin is tacked upon the frame, meat side out, and the whole hung upon a line, or similar device, which will allow the air to circulate through and around it. The shape may be changed to suit the stretching of other skins. Pegs may be driven at the corners, as in an artist's canvas stretcher, to expand the frame and stretch the material.



Homemade Device for Printing Typewritten Letters

A printing outfit that will provide endless education and amusement for the boy, besides being often very useful to his father, is the one illustrated.



This Homemade Rocking Press Prints "Typewritten" Letters at Very Slight Expense

The materials which must be purchased for its construction are as follows: About 5,000 letters of typewriter-imitation rubber type and 35 line holders. These can be obtained at any office-supply house. The holders are attached to the "cylinder" by thrusting the projections at their ends under strips of tin which are nailed around the edges of the two semicircular pieces of wood at the end. There are four of these pieces altogether, and they are cut to a 6-in. radius, either in a lathe, or by hand with a saw and file.

Each line of type should be set before the holder is placed on the cylinder, and should then be laid in next to the previous line. Spacer bars can be made if desired, and fastened in like the type holders. In operation, the cylinder is first rolled on an inking pad, which can be made by soaking blotters or felt in rubber-stamp ink, and then rolled on the paper, which should also be placed on a thin pad of felt or blotters. The pressure required is small, as each line in turn receives the entire pressure.—Philip A. Wall, Bedford, Massachusetts.

Draft Fan at Furnace Pipe Economizes Fuel

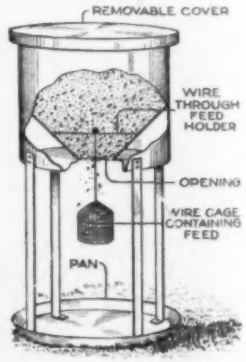
An electric fan placed at the intake of the fresh-air chamber of a hot-air furnace, and run every morning for five or ten minutes after starting the furnace, will force the air through the heating chamber, or radiator, and heat the house decidedly quicker, besides saving coal.—M. P. McArdle, Jr., Memphis, Tenn.

Transferring Smoke from Cigar to Covered Drinking Glass

The performer undertakes to transmit smoke from a cigar across the stage to a water glass covered with a saucer. He lights the cigar, puts the saucer, inverted, over the glass, and shortly afterward the latter becomes clouded with dense smoke. In preparing for this trick the performer puts a drop of strong ammonia in the glass, and a drop of hydrochloric acid in the saucer. These chemicals are invisible to the audience. When they mix, they produce dense fumes of sal ammoniac, which appear like tobacco smoke.—Justus F. Mueller, Baltimore, Md.

Automatic Chicken Feeder Saves the Feed

The chicken feeder illustrated protects the feed from the weather and from waste, but makes it always available for the chickens. The hungry hen approaches, sees the empty pan, looks upward, and sees the wire cage full of feed. She pecks at the wire cage, thus shaking the wire upon which it is hung, which extends through the main feed holder. The shaking causes feed to fall into the pan, which at once diverts the



chicken's attention, and no more is shaken down until that in the pan is exhausted. The feeder may be handily made from two pans, a few iron bars, and some galvanized iron or tin.—W. Wallace Snyder, Bedford, N. Y.

Electric-Current Detector Made of Phone Receiver

Make a coil of fine copper wire, about 1 by 2 in., on a soft-iron core. Connect to a telephone receiver. A wood or hard-rubber case will protect the coil. When placed near, or against, an alternating-current wire, a humming sound will be heard in the receiver if current is being used. Battery currents can also be detected, if ringing a bell or buzzer.—Earl T. Ross, Pasadena, Calif.

Handy Method for Hanging Doors

Doors and blinds are hard to hang because of the distance between the hinges. This makes it difficult to slip the door into the frame. One way is to countersink the pin holes on the underside of the hinges. This gives a good guide. Another way is to saw off one of the pins—preferably the lower one—about ½ in. This allows one hinge to seat itself before the other has come into position.—W. H. Thomas, Cedar Rapids, Ia.

Momentary-Ringing Door Contactors

A momentary-contact door alarm can be arranged as in Fig. 1. With this arrangement the bell rings only for an instant as the door is being opened, and then ceases until the door is being closed, when it again rings for an interval. The arrangement of this signal circuit is obvious from the illustration. The two springs may be made of any sheet metal, but bronze is the best material. The lower spring should be bent into a cam-shaped form so that when the door opens the spring will push into electrical contact with the upper spring. If the door opens farther, the pressure between the two springs ceases and the bell circuit is

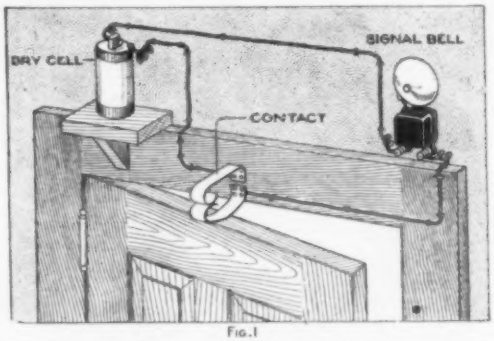


Fig. 1

Circuit of Bell-Ringing Contacts: All Parts of the Apparatus are Mounted on the Door Frame

opened. A single-point switch can be readily installed if desired.

The contactor of Fig. 1 is best adapted to locations where the door opens inward, inasmuch as any contactor of this nature should be placed inside of a building rather than outside. When the door opens outward, two sheet-metal springs can be mounted, one on the door frame and the other on the casing, as shown in Fig. 2. This contactor provides only a momentary contact. One conductor must be carried across the door to a point near one of the hinges and there stapled. Then a "pig tail" should be arranged around the hinge to complete the circuit. This pig tail may consist of a long, open coil of wire, flexible enough to prevent its

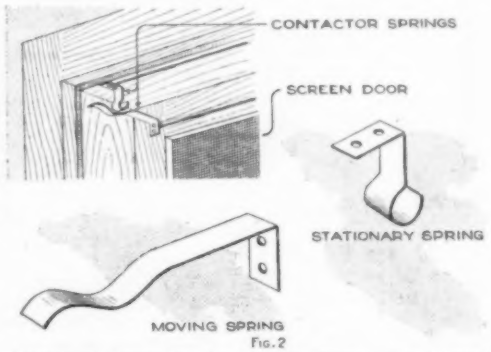


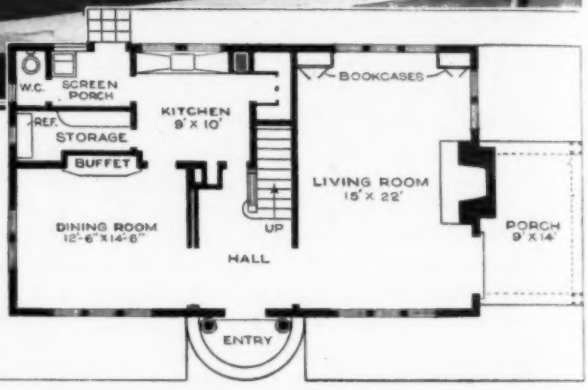
Fig. 2

Details of Contactor for Screen Door: The Signal Bell and Battery are Connected as in Figure 1

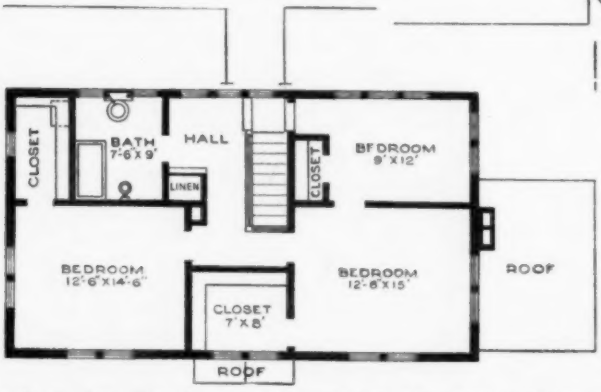
breaking at the door hinge when the door is opened and closed.—T. L. Jarvis, St. Louis, Mo.

November 20 Cents

ART AND COMFORT COMBINED IN SIX ROOMS



HOWARD JONES, ARCHITECT



FOR those to whom quaint simplicity and artistic proportion mean quite as much in a home as durable construction and convenient arrangement, the modernized Colonial dwelling portrayed here carries especial appeal. The symmetrical grouping of small-paned windows, the trellis-bordered entrance, and the old-fashioned side porch with its simple brick chimney, all lend character and dignity. Combined with this, the red-brick trim, the white-painted channel siding, and the green-stained shingle roof add freshness and an air of hospitality. The interior carries out the comfortable, airy tone of the outside. The rooms, six in number, are of generous size and livable arrangement. Particularly noteworthy is the abundant closet space that has been provided on the second floor. This, generally lacking in modern residences and apartments, makes the house well suited for the family of average size and modest requirements. The living room, of splendid proportions, is amply fitted with windows so that, like the rest of the house, it is light and cheery. The estimated cost of construction, in a southern climate, is $4,000. Old ivory and mahogany are used for the trim in the dining and living rooms, while elsewhere the woodwork is white-enameled.

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